

N83447.AR.000193
NAS FORT WORTH
5090.3a

FINAL REMOVAL AND CLOSURE OF FUEL HYDRANT SYSTEMS HEALTH AND SAFETY
PLAN NAS FORT WORTH TX
1/1/1995
JACOBS ENGINEERING



**NAVAL AIR STATION
FORT WORTH JRB
CARSWELL FIELD
TEXAS**

**ADMINISTRATIVE RECORD
COVER SHEET**

AR File Number 353



United States Air Force Air Force Base Conversion Agency

FINAL

NAS Fort Worth JRB, Texas
(Formerly Carswell AFB, Texas)

REMOVAL/CLOSURE OF THE
FUEL HYDRANT SYSTEM
HEALTH & SAFETY PLAN

JANUARY 1995



United States Air Force Air Force Base Conversion Agency

FINAL

**NAS Fort Worth JRB, Texas
(Formerly Carswell AFB, Texas)**

HEALTH & SAFETY PLAN

CAR-J03-10K70100-M3-0002

JANUARY 1995

By:



JACOBS ENGINEERING GROUP INC.
600 17th Street, Suite 1100N
Denver, CO 80202

TABLE OF CONTENTS

| | <u>Page</u> |
|--|-------------|
| Acronyms and Abbreviations | v |
| 1.0 INTRODUCTION..... | 1-1 |
| 1.1 OBJECTIVES | 1-6 |
| 1.2 NAS FORT WORTH DESCRIPTION AND HISTORY | 1-6 |
| 1.2.1 Site Description | 1-6 |
| 1.2.2 Site History..... | 1-8 |
| 1.2.3 Fuel Hydrant System..... | 1-9 |
| 1.3 DESCRIPTION OF FIELD ACTIVITIES..... | 1-10 |
| 2.0 FIELD OPERATIONS ADMINISTRATION..... | 2-1 |
| 2.1 PROJECT ORGANIZATION | 2-1 |
| 2.2 FIELD TEAM PERSONNEL..... | 2-1 |
| 2.3 PERSONNEL RESPONSIBILITIES..... | 2-1 |
| 2.3.1 Project Personnel | 2-2 |
| 2.3.2 Staff Health and Safety Professionals..... | 2-3 |
| 2.4 EMPLOYEE MEDICAL SURVEILLANCE..... | 2-4 |
| 2.4.1 Baseline or Preassignment Monitoring..... | 2-4 |
| 2.4.2 Annual Monitoring..... | 2-5 |
| 2.4.3 Exit Physical | 2-6 |
| 2.4.4 Exposure/Injury/Medical Support..... | 2-6 |
| 2.5 TRAINING | 2-6 |
| 2.6 COMMUNICATION | 2-7 |
| 2.6.1 Hazard Communication..... | 2-7 |
| 2.6.2 Employee Health and Safety Briefing | 2-7 |
| 2.6.3 Daily Tailgate Meetings..... | 2-8 |
| 2.7 DESCRIPTION OF SUBCONTRACTORS | 2-8 |
| 2.8 VISITORS | 2-9 |
| 3.0 HAZARD EVALUATION AND CONTROL..... | 3-1 |
| 3.1 RISK ANALYSIS | 3-1 |
| 3.2 PHYSICAL CONSTRUCTION/PHYSICAL HAZARDS..... | 3-1 |

| | | |
|-------|--|------|
| 3.7 | CONFINED SPACE HAZARD..... | 3-10 |
| 4.0 | SITE CONTROL | 4-1 |
| 4.1 | SITE CONTROL PROCEDURES | 4-1 |
| 4.2 | WORK PRACTICES | 4-3 |
| 4.3 | DECONTAMINATION PROCEDURES | 4-4 |
| 4.3.1 | Samples and Equipment | 4-4 |
| 4.3.2 | Personnel | 4-5 |
| 4.4 | SPILL CONTAINMENT PROCEDURES | 4-5 |
| 4.5 | DISPOSAL OF WASTE MATERIALS GENERATED ONSITE..... | 4-10 |
| 5.0 | AIR MONITORING | 5-1 |
| 5.1 | ENVIRONMENTAL MONITORING..... | 5-1 |
| 5.2 | PERSONAL EXPOSURE MONITORING | 5-1 |
| 6.0 | PERSONAL PROTECTIVE EQUIPMENT | 6-1 |
| 7.0 | EMERGENCY RESPONSE/CONTINGENCY PLAN..... | 7-1 |
| 7.1 | EMERGENCY PLANNING | 7-1 |
| 7.2 | EMERGENCY EQUIPMENT AND SUPPLIES..... | 7-2 |
| 7.3 | EMERGENCY PROCEDURES..... | 7-4 |
| 7.3.1 | Emergency Medical Treatment..... | 7-4 |
| 7.3.2 | Fire | 7-5 |
| 7.3.3 | Personal Protective Equipment Failure | 7-5 |
| 7.3.4 | Other Equipment Failure | 7-5 |
| 7.3.5 | Spills..... | 7-5 |
| 7.4 | BLOODBORNE PATHOGEN PROVISION | 7-5 |
| 7.5 | EVACUATION..... | 7-7 |
| 7.5.1 | Evacuation Routes and Assembly Points | 7-7 |
| 7.5.2 | Hospital Location and Information | 7-7 |
| 7.6 | EMERGENCY RESPONSE CONTACTS | 7-8 |
| 7.7 | POSTINCIDENT OR EMERGENCY NOTIFICATIONS AND RECORD KEEPING..... | 7-10 |
| 7.8 | VEHICLE ACCIDENT PROCEDURE..... | 7-10 |
| 8.0 | RECORD KEEPING..... | 8-1 |
| 9.0 | SITE POSTINGS..... | 9-1 |
| 10.0 | PLAN APPROVAL..... | 10-1 |

| | |
|-------------------------------------|------|
| 7.8 VEHICLE ACCIDENT PROCEDURE..... | 7-10 |
| 8.0 RECORD KEEPING..... | 8-1 |
| 9.0 SITE POSTINGS..... | 9-1 |
| 10.0 PLAN APPROVAL..... | 10-1 |
| 11.0 REFERENCES..... | 11-1 |

List of Figures

| | |
|---|-----|
| Figure 1-1 Location of NAS Forth Worth..... | 1-5 |
| Figure 4-1 Typical Site Control Layout..... | 4-2 |
| Figure 4-2 Typical Level D and D+ Decontamination Minimum Layout..... | 4-6 |
| Figure 4-3 Typical Level B and C Decontamination Minimum Layout..... | 4-7 |
| Figure 7-1 Emergency Response Operations..... | 7-3 |
| Figure 7-2 Emergency Route to Hospital..... | 7-9 |

List of Tables

| | |
|---|------|
| Table 1-1 Summary of Suspected Fuel Hydrant System Hazards..... | 1-3 |
| Table 3-1 Example of a Project Hazard Analysis..... | 3-2 |
| Table 3-2 Physical Hazards and Controls..... | 3-4 |
| Table 3-3 Suspected Contaminants at Fuel Hydrant System..... | 3-7 |
| Table 3-4 Hazardous Chemical Substances of Occupational Health Concern..... | 3-8 |
| Table 3-5 Generic Chemicals That May Be Brought Onsite..... | 3-9 |
| Table 3-6 Symptoms and Treatment of Heat and Cold Stress..... | 3-11 |
| Table 4-1 Decontamination Procedures..... | 4-8 |
| Table 5-1 Calibration Specification..... | 5-2 |
| Table 5-2 Equipment Specification and Action Levels..... | 5-3 |
| Table 6-1 Personal Protective Equipment Specifications..... | 6-2 |
| Table 6-2 Reasons to Upgrade or Downgrade Level of Protection..... | 6-3 |

TABLE OF CONTENTS

List of Appendices

| | |
|------------|---|
| Appendix A | Employee Signoff |
| Appendix B | Hazard Communication |
| Appendix C | Generic Chemical Hazard Profiles |
| Appendix D | Detailed Biological, Physical (Safety), and Radiological Hazards and Controls |
| Appendix E | Site Tailgate Meeting and Exclusion Zone Entry Log |
| Appendix F | Visitor's Log |
| Appendix G | Material Safety Data Sheet (MSDS) Information |
| Appendix H | Equipment Decontamination Procedures |
| Appendix I | Health and Safety Forms |
| Appendix J | Accident Investigation and Notification |
| Appendix K | Code of Safe Practices |

ACRONYMS AND ABBREVIATIONS

| | |
|-------|---|
| ab | above background |
| ACC | Air Combat Command |
| ACGIH | American Conference of Governmental Industrial Hygienists |
| AFB | Air Force Base |
| AFBCA | Air Force Base Conversion Agency |
| AFCEE | Air Force Center for Environmental Excellence |
| AIHA | American Industrial Hygiene Association |
| ANSI | American National Standards Institute |
| ASTM | American Society for Testing and Materials |
| BP | boiling point |
| CFR | Code of Federal Regulations |
| CGI | combustible gas indicator |
| CNS | central nervous system |
| COE | U.S. Army Corps of Engineers |
| COR | Contracting Officer's Representative |
| CPR | cardiopulmonary resuscitation |
| CQP | Construction Quality Plan |
| CRZ | Contamination Reduction Zone |
| CS | Construction Safety |
| CVS | cardiovascular system |
| DBCRA | Defense Base Closure and Realignment Act |
| DOT | U.S. Department of Transportation |
| dBA | decibels (on the A-weighted scale) |
| ECP | Environmental Cleanup Plan |
| EH&S | environmental health and safety |
| EPA | U.S. Environmental Protection Agency |
| eV | electron volts |
| EZ | exclusion zone |
| F | Fahrenheit |

ACRONYMS AND ABBREVIATIONS

| | |
|-------------------|---|
| FID | flame ionization detector |
| FP | flash point |
| GI | gastrointestinal |
| HNu | photoionization meter |
| HSP | Health and Safety Plan |
| IDLH | immediately dangerous to life and health |
| IP | ionization potential |
| IRP | Installation Restoration Program |
| I-30 | Interstate Highway I-30 |
| Jacobs | Jacobs Engineering Group Inc. |
| JRB | Joint Reserve Base |
| kV | kilovolts |
| LEL | lower explosive limit |
| L/min | liters per minute |
| mg/kg | milligrams per kilogram |
| mg/m ³ | milligrams per cubic meter |
| MP | melting point |
| MSA | Mine Safety Appliance |
| MSDS | Material Safety Data Sheet |
| msl | mean sea level |
| N/A | not applicable |
| NAS | Naval Air Station |
| NFPA | National Fire Protection Association |
| NIOSH | National Institute for Occupational Safety and Health |
| O ₂ | Oxygen |
| OMC | occupational medical consultant |
| OSHA | U.S. Occupational Safety and Health Administration |
| OVA | organic vapor analyzer |
| PAPR | powered air purifying respirator |

ACRONYMS AND ABBREVIATIONS

| | |
|-------|---|
| PE | polyethylene |
| PEL | permissible exposure limit |
| PHSD | Project Health and Safety Director |
| PHSM | Project Health and Safety Manager |
| PID | photoionization detector |
| PjM | Project Manager |
| POL | petroleum, oils, and lubricants |
| PPE | personal protective equipment |
| ppm | parts per million |
| QPP | Quality Program Plan |
| RCRA | Resource Conservation and Recovery Act |
| reg | regulator |
| REL | recommended exposure limit |
| RI/FS | Remedial Investigation/Feasibility Study |
| SAC | Strategic Air Command |
| SAP | Sampling and Analysis Plan |
| SCBA | self-contained breathing apparatus |
| SHSC | Site Health and Safety Coordinator |
| SOPs | standard operating procedures |
| SPF | sun protection factor |
| STEL | short-term exposure limit |
| SWMU | solid waste management unit |
| SZ | support zone |
| TBD | to be determined |
| TLV | threshold limit value |
| TSDF | treatment, storage, and disposal facility |
| UEL | upper explosive limit |
| UL | Underwriter's Laboratories |
| USCG | United States Coast Guard |

ACRONYMS AND ABBREVIATIONS

| | |
|-----------------|------------------------------------|
| UST | underground storage tank |
| UV | ultraviolet |
| UVA | ultraviolet A |
| UVB | ultraviolet B |
| VP | vapor pressure |
| WBGT | wet bulb globe temperature (index) |
| WSA | Weapons Storage Area |
| yd ³ | cubic yards |
| µg/L | micrograms per liter |
| ° | degrees |
| > | greater than |
| % | percent |
| ± | plus or minus |

1.0 INTRODUCTION

This Health and Safety Plan (HSP) has been written for use by Jacobs Engineering Group Inc. (Jacobs) and any other individuals authorized to access areas where site control is established to conduct fieldwork. It may also be used as a guidance document by properly trained and experienced personnel. However, Jacobs does not guarantee the health and safety of any person entering this site. Because of the nature of this site and the activity occurring thereon, it is not possible to discover, evaluate, and provide protection for all possible hazards that may be encountered; however, a summary of suspected hazards is listed in Table 1-1. Strict adherence to the health and safety guidelines stated in this HSP will reduce, but not eliminate, the potential for injury on the site. The health and safety guidelines in this plan were prepared specifically for this site and should not be used on any other site without prior research by trained health and safety professionals.

This HSP has been prepared by Jacobs Engineering Group Inc. (Jacobs) for the closure of the fuel hydrant system at Naval Air Station (NAS) Fort Worth Joint Reserve Base (JRB), Carswell Field, Fort Worth, Texas (Figure 1-1). This station was formerly called Carswell Air Force Base (AFB), and will be referred to in this document as NAS Fort Worth. The HSP constitutes one of the planning documents required by the Statement of Work for Contract F41624-94-D-8116, Delivery Order 0002, issued to Jacobs by the Air Force Center for Environmental Excellence (AFCEE). Other planning documents prepared for this contract and delivery order include the Sampling and Analysis Plan (SAP), Construction Quality Plan (CQP), and the Environmental Cleanup Plan (ECP).

This HSP will be kept onsite during field activities and will be reviewed and updated as necessary to reflect current site conditions and operations. This HSP requires that the Program Health and Safety Director (PHSD), Project Health and Safety Manager (PHSM), and Site Health and Safety Coordinator(s) (SHSC) shall be familiar with the following:

- applicable federal, state, and local regulations;
- standard operating procedures (SOPs) contained in the Jacobs Environmental Health and Safety (EH&S) Manual (Jacobs undated a) and Jacobs Corporate Safety Manual (Jacobs undated b). These manuals will be available at the site office;
- requirements found in the AFCEE Handbook for the Installation Restoration Program (IRP) Remedial Investigations and Feasibility Studies (RI/FS) (U.S. Air Force 1993);
- requirements found in the U.S. Army Corps of Engineers (COE) Safety and Health Requirements Manual (COE 1992); and
- procedures contained in the work plan(s) for this project and Quality Program Plan (QPP) documents for the project.

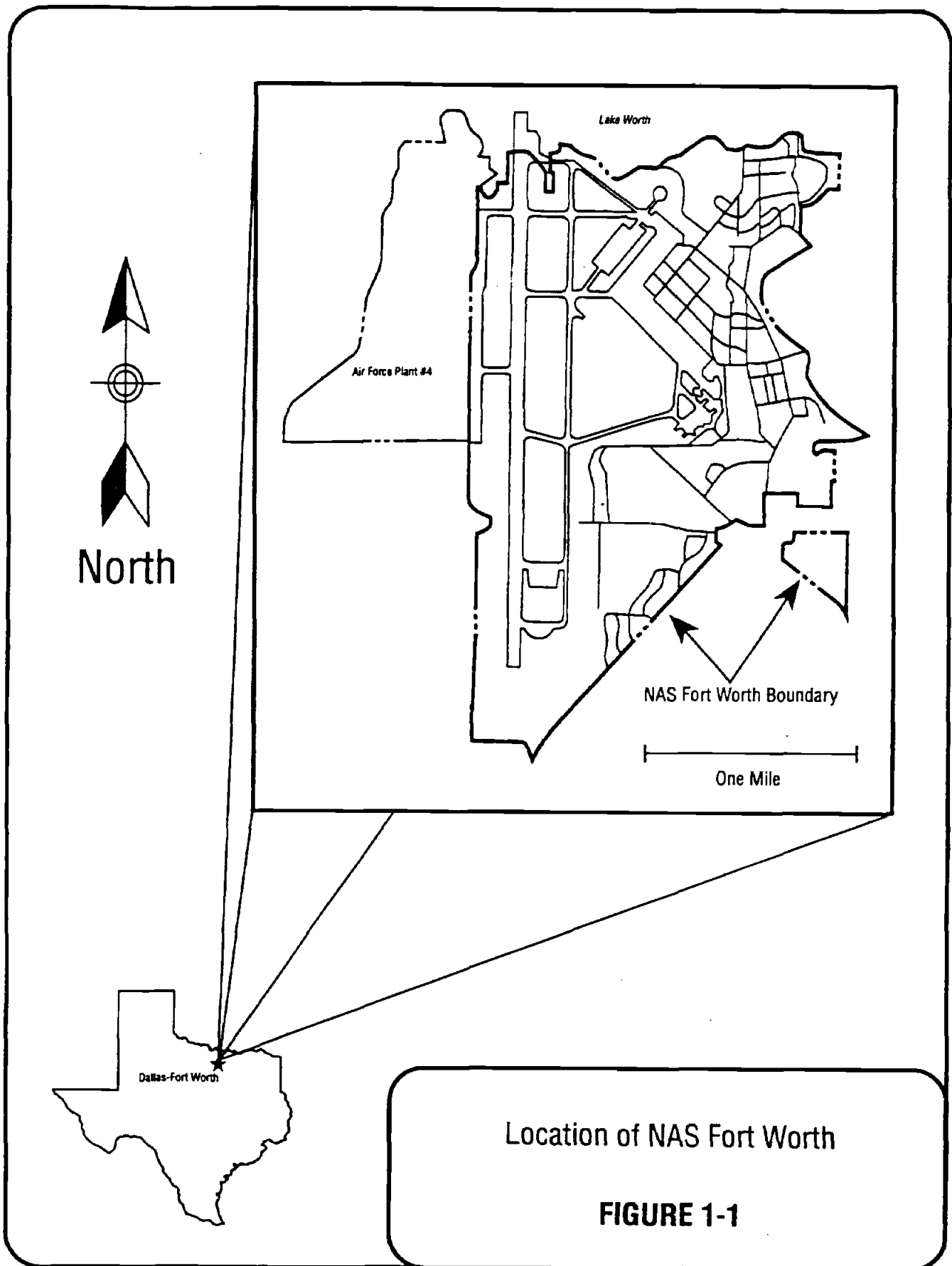
In addition to this HSP, each subcontractor is expected to have its own health and safety program covering its own specific operational activities; e.g., drilling, excavating, tank removal, et cetera. In any case where overlaps or conflicts occur between requirements in this HSP and a subcontractor's health and safety procedures, the requirement that is most protective of the employee's health and safety will take precedence.

The overall intent of this HSP is to create a site health and safety program that effectively identifies, evaluates, controls, and reduces health and safety hazards.

This HSP is written for the site conditions, purposes, dates, and personnel specified and must be amended if these conditions change. Jacobs claims no responsibility for use of this plan by others.

TABLE 1-1
Summary of Suspected Fuel Hydrant System Hazards

| Tasks | Physical¹ | Chemical² | Biological³ | Air Monitoring⁴ | Initial Entry PPE⁵ |
|---|--|--|--|--|--------------------------------------|
| Mobilization | <ul style="list-style-type: none"> • uneven surfaces • utilities • vehicle accidents | <ul style="list-style-type: none"> • not expected | <ul style="list-style-type: none"> • insects • rodents • reptiles | <ul style="list-style-type: none"> • possible screening | D |
| Utility Clearance <ul style="list-style-type: none"> • hand augering or nondestructive drilling • asphalt or cement coring • geophysical tracing | <ul style="list-style-type: none"> • uneven surfaces aboveground and below ground utilities • sunlight; UV exposure • flying objects/debris | <ul style="list-style-type: none"> • fuels • waste oils | <ul style="list-style-type: none"> • insects • rodents • reptiles | <ul style="list-style-type: none"> • initial screening with PID | D |
| Tank Removals <ul style="list-style-type: none"> • excavation • cleaning, inerting, removing tanks • cleaning, inerting, removing piping • stockpiling soils • pneumatically cutting tanks and piping • area restoration | <ul style="list-style-type: none"> • uneven surfaces • sunlight; UV exposure • heavy equipment • traffic • flying objects/debris • noise • high pressure hose • rupture • cave-in • explosions | <ul style="list-style-type: none"> • fuels • metals • waste oils | <ul style="list-style-type: none"> • insects • rodents • reptiles | <ul style="list-style-type: none"> • PID • CGI/O₂ | D+ |
| Building Demolition <ul style="list-style-type: none"> • cutting overhang • removing roof • knock-out of walls • cutting into smaller pieces | <ul style="list-style-type: none"> • uneven surfaces • heavy equipment • sunlight; UV exposure • heat; UV exposure from cutting process • noise | <ul style="list-style-type: none"> • metal fume fever • gases from cutting • dust | <ul style="list-style-type: none"> • insects • rodents • reptiles | <ul style="list-style-type: none"> • dust | D |



Location of NAS Fort Worth

FIGURE 1-1

1.1 OBJECTIVES

Jacobs will remove six underground storage tanks (USTs) with their associated piping, demolish pumping station C, and grout and abandon approximately 4 miles of fuel pipeline.

1.2 NAS FORT WORTH DESCRIPTION AND HISTORY

The following sections include a site description, site history, and description of the fuel hydrant system.

1.2.1 Site Description

NAS Fort Worth is located in north-central Texas in Tarrant County, 8 miles west of downtown Fort Worth. The station property, totaling 2,555 acres, consists of the main station and two noncontiguous parcels. The main station comprises 2,264 acres and is bordered by Lake Worth to the north, the West Fork of the Trinity River and Westworth Village to the east, Fort Worth to the northeast and southeast, White Settlement to the west and southwest, and Air Force Plant 4 to the west. The area surrounding NAS Fort Worth is mostly suburban, including the residential areas of the cities of Fort Worth, Westworth Village, and White Settlement.

The existing land uses in the immediate vicinity of the station include industrial, commercial, residential, and recreational. The land uses west of the station are predominantly residential and industrial. These include single-family residences, supporting commercial centers, Air Force Plant 4, and an industrial complex in White Settlement.

The predominant development south of the station is the commercial area located at the Interstate Highway I-30 (I-30) and State Highway 183 interchange. This area includes a discount-oriented retail center, a regional shopping mall, and a convenience center.

Various types of residential development occur southeast of the station, north of I-30. Single-family housing is also found on the eastern side of the station, from the Kings Branch housing tract north to Meandering Road.

Public/recreational land uses occur north of the station, surrounding Lake Worth. Public access along the southern shore of Lake Worth is currently restricted because of NAS Fort Worth activities. A fish hatchery, YMCA camp, and private recreation lands are located along the West Fork of the Trinity River, northeast of the station.

The area surrounding the Offsite Weapons Storage Area (WSA) is primarily rural. A residential development is located south of White Settlement Road.

NAS Fort Worth is located within the Grand Prairie section of the Central Lowlands Physiographic Province. The area is characterized by broad terrace surfaces sloping gently eastward, interrupted by westward-facing escarpments. The topography of the station is fairly flat, except for areas near Farmers Branch Creek and the Trinity River. Elevations average 650 feet above mean sea level (msl) and range from 550 feet above msl in the east to 690 feet above msl in the southwest.

The climate in the Fort Worth region is subhumid with mild winters and hot, humid summers. The average annual precipitation is 31.5 inches, with the majority falling between April and October. The average annual temperature is 66 degrees Fahrenheit (°F). July is the hottest month with an average monthly temperature of 86° F, while January is the coldest month with an average monthly temperature of 45° F. Temperature changes are rapid and often change 20° to 30° in several hours. The average annual relative humidity is 63 percent.

Prevailing winds are primarily southerly from March through November and northerly from December through February; the average wind speed is 8 knots. Severe thunderstorms with windspeeds of 65 knots and hail storms are common. Climate conditions in summer make tornado formations possible, although there is more property damage each year as a result of hail than tornadoes.

1.2.2 Site History

In 1984, the IRP was initiated at NAS Fort Worth and began with a program records search conducted by CH2M Hill, Inc. Since 1984, Air Force IRP studies have been conducted by several contractors and have focused on the identification and characterization of waste disposal areas and solid waste management units (SWMUs) identified in the installation's Resource Conservation and Recovery Act (RCRA) Part B permit.

Pursuant to the Defense Base Closure and Realignment Act (DBCRA) of 1990, Carswell Air Force Base (AFB) was selected for closure and associated property disposal during Round II Base Closure Commission deliberations. This announcement initiated the closure and the disposal and rescue planning processes. Drawdown activities were initiated in 1992 and all 7 Bomb Wing aircraft were relocated by January 1993. The station officially closed on 30 September 1993. On 01 October 1994, the U.S. Navy assumed responsibility for the former Carswell AFB. The base was renamed NAS Fort Worth. The 1993 DBCRA decisions have further impact on the realignment and partial disposal of property.

The area now known as NAS Fort Worth was originally a modest dirt runway built to service an aircraft manufacturing plant located where Air Force Plant 4 is now. When it was established in 1942, the installation was referred to as the Tarrant Field Airdrome and was originally under the jurisdiction of the Gulf Coast Army Air Field Training Command. Its mission was to provide transition training for the B-24 bomber pilots, and served as a heavy bomber base until closure. The Strategic Air Command (SAC) assumed control of

the installation in 1946 and the station served as headquarters for the Eighth Air Force. The station was renamed Carswell AFB in 1948 in honor of Fort Worth native, Major Horace S. Carswell. At that time, the 7 Bomb Wing became the base host unit. In 1951, Headquarters 19 Air Division was located at Carswell AFB where it remained until September 1988, the longest tenure of any air division in SAC. Carswell AFB became home base for its first B-52s and KC-135s in 1956. The Air Combat Command (ACC) assumed control of the base in 1992 with the disestablishment of SAC.

The majority of the station property was acquired in the 1940s with most of the property acquired from the city of Fort Worth in 1941; additional property including most of the south station, the hospital area, and the Offsite WSA was acquired during the 1950s. Kings Branch and south station residential areas were acquired in 1960. Several miscellaneous additional properties totaling less than 10 acres have been acquired since 1970.

1.2.3 Fuel Hydrant System

The fuel hydrant system consists of piping, pumps, and fuel storage tanks. The piping consists of more than 17,000 feet of 8-, 6-, and 3-inch diameter steel pipeline. The pipeline network was designed to deliver jet fuel from the petroleum, oils, and lubricants (POL) tank farm to pumping stations on the flight line. A pumping station consists of six 25,000-gallon USTs, a filtering system, delivery pumps, and a shelter that surrounds and protects the system. Each station supplies several refueling hydrants on the edge of the Alert Apron. Five of these stations were built on the flight line during construction of the hydrant system.

In 1992, pumping station E and associated piping were removed by COE. Fuel-contaminated soil was encountered during the removal but no soil was removed from the site and the area of contamination was not delineated.

In 1994, COE removed pumping stations A, B, and D. The same approach was used in removing these stations as was used for station E. The fieldwork for this project was completed in July 1994.

In 1990, a leak in the fuel hydrant line (Spot 35) was discovered and repaired by station maintenance, but not before an undetermined amount of fuel leaked and contaminated the soil. In 1990, Maxim Engineers, Inc. completed a soil and groundwater investigation report on the site stating that both soil and groundwater had been contaminated with JP-4 fuel and that additional investigations to delineate the extent of contamination would be necessary (Maxim Engineers, Inc. 1990). No other investigations have been conducted at this site.

1.3 DESCRIPTION OF FIELD ACTIVITIES

This project can be broken down into the following tasks:

- site mobilization;
- USTs gauging for quantity and quality of residual fuel;
- removal of remaining fuel from tanks and associated piping;
- inerting tanks (if necessary) and removing surface pumps and pipes;
- excavating to 1 foot of the top of a tank;
- shoveling to uncover tank;
- removal of tanks;

- sampling of soil beneath tanks (no one to enter excavation, samples to be collected from backhoe bucket) and along sidewalls of excavation;
- cleaning, cutting up, and recycling of removed tanks;
- draining, cleaning, and recycling of removed piping;
- demolition of structures, to be accomplished in the following phases:
 - flame cutting of "I" beam supports and knee braces;
 - toppling of overhanging shed roof, cutting material into smaller pieces for recycling;
 - detaching and removing roof, and cutting material into smaller pieces for disposal or recycling; and
 - cutting building into smaller pieces for landfilling or recycling.
- locating fuel pipeline;
- inerting pipeline, removing residual fuel, and grouting in place;
- screening by photoionization detector (PID) and segregating, according to results, the soils removed from all excavation; stockpiling soils on visqueen, and ultimately classifying for disposal; and
- collecting soil samples with a drive-point sampler, field screening with a PID, field analyzing with an immunoassay kit, submitting confirmation samples to off-site analytical laboratory.

2.0 FIELD OPERATIONS ADMINISTRATION

The following sections describe the project organization and health and safety responsibilities.

2.1 PROJECT ORGANIZATION

| | | |
|---|------------------------|------------------------------|
| Project Manager (PjM): | Lynn Schuetter | (303) 595-8855 |
| AFCEE Contracting Officer's Representative (COR): | Captain Joseph Feaster | (210) 536-5275 |
| Base Conversion Activity Coordinator: | Frank Grey | (817) 731-8973, extension 17 |
| Base Engineering Technician: | Alan Flolo | (817) 731-8973, extension 18 |
| Program Manager: | Lynn Schuetter | (303) 595-8855 |
| PHSD | Terry Briggs | (303) 595-8855 |
| PHSM | to be determined (TBD) | |
| Alternate (PHSM): | TBD | |
| Site Manager | John McManus | |

2.2 FIELD TEAM PERSONNEL

The field team members will be listed in the HSP once they are determined.

2.3 PERSONNEL RESPONSIBILITIES

The following sections delineate the responsibilities of personnel associated with this project.

2.3.1 Project Personnel

The following personnel are directly responsible for health and safety procedures for this project.

Project Manager. The Project Manager is responsible for coordinating overall planning of work and coordinating supervision of work.

Site Manager. The Site Manager promotes a safe working environment through a concerted effort with the PHSM and PHSD, implements the HSP, and has “stop-work authorization” when an imminent hazard or potentially dangerous work practice exists.

Project Health and Safety Manager. The PHSM has the following responsibilities:

- administers this HSP;
- verifies current certifications of individuals' medical fitness, training, and respirator fit per Section 2.4, before authorizing access to areas where site control is established;
- conducts emergency planning action items per Section 7.1;
- arranges for health and safety equipment to be available onsite in accordance with this HSP;
- conducts employee health and safety communications per Section 2.6 before the start of field activities;
- oversees the performance of SHSCs who work with specific crews, e.g., the geologist at a drilling site may be an SHSC;
- establishes and enforces site controls per Section 4.0;

- conducts periodic inspections of work practices to determine effectiveness of this HSP (deficiencies are noted, reported to the Site Manager, PjM, and PHSD);
- assists in independent health and safety site audits conducted by Jacobs corporate personnel, the regulatory agencies, or the client;
- conducts accident investigations of injuries, illnesses, and other incidences;
- has "stop-work authorization" when an imminent hazard or potentially dangerous work practice exists; and
- completes and submits record keeping forms per this HSP and corporate SOPs.

Site Health and Safety Coordinator. The SHSC assists the PHSM and Site Manager in all duties related to the implementation of this HSP. The SHSC also serves as the alternate PHSM in his/her absence.

2.3.2 Staff Health and Safety Professionals

The following personnel will provide support for health and safety issues on this project.

Program Health and Safety Director. The PHSD is responsible for the following:

- oversees development and implementation of the health and safety program;
- provides project personnel with technical guidance for conducting fieldwork in a safe and healthful manner;
- assists with preparation and/or reviews and approves site-specific HSPs; and

- conducts field audits as necessary and in accordance with Jacobs policies and procedures.

Occupational Medical Consultant. The Occupational Medical Consultant (OMC) prescribes and interprets results of medical examination protocols and testing for Jacobs employees who participate in the Jacobs Occupational Medical Program.

2.4 EMPLOYEE MEDICAL SURVEILLANCE

The PHSM or Site Manager shall authorize individuals to access areas where site control is established (to conduct fieldwork in accordance with this HSP only) if current certification of medical fitness, training, and respirator fit are in accordance with 29 Code of Federal Regulations (CFR) 1910.120. Copies of certifications shall be on file. (Refer to Jacobs Corporate Health and Safety Manual [Jacobs undated a], Sections 3.0 and 5.0.)

Employees of teaming partners and subcontractors will provide documentation of their participation in a medical surveillance program before the start of fieldwork. Documentation will be maintained in the project files.

At this time, additional medical tests will not be performed before site entry.

2.4.1 Baseline or Preassignment Monitoring

Before being assigned to a hazardous or potentially hazardous activity involving exposure to toxic materials, each employee must receive a preassignment or baseline physical examination. The content of the examination is to be determined by the employers' medical consultant. As suggested by National Institute for Occupational Safety and Health (NIOSH)/OSHA/U.S. Coast Guard/U.S. Environmental Protection Agency (EPA) *Occupational Safety & Health Guidance Manual for Hazardous Waste Site Activities* (NIOSH et al. 1985), the minimum medical monitoring requirements for work at Indian Mountain LRRS are as follows:

- complete medical and work histories;
- physical examination;
- pulmonary function test, forced vital capacity and forced expiratory volume;
- chest X-ray;
- electrocardiogram;
- eye examination and visual acuity;
- audiometry;
- urinalysis; and
- blood chemistry, including hematology and serum analyses.

At present, no additional testing for specific contaminant health effects is required.

The preassignment physical examination should categorize employees as fit for duty and able to wear respiratory protection.

2.4.2 Annual Monitoring

In addition to the baseline physical examination, all employees are required to obtain an annual physical exam, unless the advising physician believes a shorter interval is appropriate. The employers' medical consultant will prescribe an adequate physical examination that meets OSHA 29 CFR 1910.120 requirements. The preassignment medical monitoring criteria outlined previously may be applicable.

All personnel working in contaminated or potentially contaminated areas at NAS Fort Worth will verify that their medical monitoring is current (within 12 months). Jacobs' subcontractors will have documentation onsite specifying all employees are fit for duty. Each certificate will be signed by an attending physician.

2.4.3 Exit Physical

Enrollment in the medical monitoring program will end when the employee terminates the program or the company. At that time, an exit examination for the employee is required. Each employee will undergo an exit physical examination unless written documentation waiving this requirement is provided.

2.4.4 Exposure/Injury/Medical Support

As follow-up to an injury or a possible exposure above an established exposure limit, all employees are entitled and encouraged to seek medical attention and physical testing. Depending on the type of exposure, it is critical to perform follow-up testing within 24 to 48 hours. It will be up to the employers' medical consultant to advise the type of test or tests required to accurately monitor for exposure effects.

2.5 TRAINING

Training records and training content are maintained for Jacobs employees by the Jacobs Medical and Training Coordinator in Jacobs' Denver Office. Only personnel with documentation in compliance with the training requirements of 29 CFR 1910.120 will enter exclusion zones.

Employees of teaming partners and subcontractors will provide documentation of required training before the start of fieldwork. This documentation will be maintained in project files.

2.6 COMMUNICATION

If health and safety concerns arise during field activities, the steps below should be followed:

- Health and safety concerns in the field shall be brought to the attention of the PHSM and/or Site Manager.
- Health and safety field concerns that the PHSM and/or Site Manager are unable to address satisfactorily shall be brought to the attention of the PHSD.
- In the event of an accidental incident or emergency, notify responsible personnel per Section 7.6.

2.6.1 Hazard Communication

To satisfy the training and hazard communication requirements of 29 CFR 1910.120, field team members shall be provided a copy of this HSP and agree to abide by it by signing the signoff sheet in Appendix A. A Hazard Communication Form shall also be signed by field team members. (Refer to Appendix B.)

2.6.2 Employee Health and Safety Briefing

The PHSM or Site Manager shall conduct a health and safety briefing before authorizing individual access to areas where site control is established. The PHSM or Site Manager shall document attendance and the topics discussed, including at least the following:

- work plan and individual assignments;
- potential hazards of the work to be performed (Section 3.0 and Appendices C and D);
- site controls and air monitoring action levels that will be in effect onsite;
- personal protective equipment (PPE) to be used;
- communication procedures, including evacuation/emergency signals; and

- emergency response/contingency plan and rescue operations.

2.6.3 Daily Tailgate Meetings

The PHSM or Site Manager shall conduct daily health and safety tailgate meetings before field team personnel perform fieldwork. The PHSM or Site Manager shall document attendance (using the form in Appendix E) and the topics discussed, including at least the following:

- any potential hazards of the work to be performed that were not previously discussed;
- discussion and resolution of any health and safety concerns or problems since the previous tailgate meeting; and
- evacuation routes and emergency signals warnings.

Daily meetings may be augmented by additional meetings if warranted. The daily meeting combines the pre- and post-workday meeting required by COE's Safety and Health Requirements (EM 385-1-1).

2.7 DESCRIPTION OF SUBCONTRACTORS

Subcontractors to be used on this project include Riedel Environmental Services, Inc. and a drive-point sampling subcontractor to be identified at a later date.

Subcontractors who will be working onsite must present certification that they are trained in accordance with hazardous waste laws, have been approved by a physician for hazardous waste work, and are fit to wear a respirator. A copy of this HSP will be given to potential subcontractors. Before working onsite, subcontractors shall agree to abide by this HSP by signing the signoff sheet in Appendix A.

The PHSM or Site Manager will inform the subcontractor's site manager of any health and safety violations. Under certain conditions, such as personnel not equipped with the proper protective equipment or personnel entering an unshored or sloped trench, the PHSM or Site Manager may stop subcontractors from working and may seek to terminate the contract.

2.8 VISITORS

Visitors to this site are required to read and understand this HSP, and to verify training and participation in a medical surveillance program. Forms in Appendices A and F must be signed by each visitor.

Once this signing is complete and the visitor is wearing the required PPE, the visitor may enter the exclusion zone. However, in most cases visitors will be limited to the control zone or support zone. Visitors will be escorted by a site representative.

3.0 HAZARD EVALUATION AND CONTROL

The following sections describe the types of hazards expected on this project and the methods that will be used to control those hazards.

3.1 RISK ANALYSIS

This project is rated medium to high hazard because of the nature of the contaminants, the site locations, and fieldwork requiring excavations. Table 3-1 summarizes the project tasks, hazards, and controls. The remainder of this section will describe potential hazards and controls in greater detail.

3.2 PHYSICAL CONSTRUCTION/PHYSICAL HAZARDS

Potential safety hazards both specific to this site and general to most site work are shown in Table 3-2. General information has been provided as a reminder even though sunburn and heat stress may not be hazards during winter months. Refer to Appendix D for more detailed information concerning safety hazards and controls.

3.3 CHEMICAL HAZARDS AND CONTROL

The suspected contaminants onsite are listed in Table 3-3. The physical, chemical, and health effects of hazardous chemical substances are itemized in Table 3-4. Generic chemical hazard profiles of these substances by groups (e.g., metals, corrosives, petroleum-based hydrocarbons, and spent ordnance residues) are provided as Appendix C to this HSP. Refer also to Jacobs SOPs 7.0 through 7.9.

Generic chemical hazard profiles are provided in Appendix C for those chemicals that are typically used for sampling equipment decontamination and immunoassay test kit reagents. These chemicals are also listed in Table 3-5. More detailed Material Safety Data Sheet (MSDS) information specific to each chemical is provided in Appendix G.

TABLE 3-1

Example of a Project Hazard Analysis

| Task/Activity | Potential Hazards | Controls/Jacobs SOPs |
|---|---|--|
| Site Mobilization Heavy equipment operation | <ul style="list-style-type: none"> Equipment accidents, personal injuries, fall of suspended load, crushing injuries Vehicle accidents Dust generation Crushing injuries, vehicle accidents Utilities/electrocution | <ul style="list-style-type: none"> Operator certification: training must comply with EM385.1.1/18A Access restrictions, air monitoring Air monitoring, dust suppression procedure Enforce/train in code of safe practices Vehicle safety procedures enforcement Ground fault circuit interrupters on all circuits lockout tagout program |
| Trailer installation | | |
| Electrical hookups | | |
| Tank Removal(s) Excavation | <ul style="list-style-type: none"> Crane operation during tank removal | <ul style="list-style-type: none"> Operator certification; comply with Jacobs CS/SOP 10.9: Cranes, Operation, and Control |
| Cleaning, inerting, and removing tanks | <ul style="list-style-type: none"> Other heavy equipment operation | <ul style="list-style-type: none"> Operator certification, training, equipment inspections |
| Cleaning and inerting piping | <ul style="list-style-type: none"> Exposure to fuels and waste oil | <ul style="list-style-type: none"> Enforce Jacobs CS/SOP 7.7: Utility Clearance |
| Stockpiling soils, segregating, and disposal | <ul style="list-style-type: none"> Rigging accidents | <ul style="list-style-type: none"> Enforce Jacobs CS/SOP 10.10: Rigging |
| Cutting (flame) or pneumatically cutting tanks and piping | <ul style="list-style-type: none"> Cutting burns, fire, and metal fume fever | <ul style="list-style-type: none"> Enforce Jacobs CS/SOP 10.8: Oxy Fuel Cutting/Heating/Welding |
| Other tasks | <ul style="list-style-type: none"> Small-tool-use physical injury Fall hazards Materials handling physical injuries Impact hazards Noise Animal and plant hazards Cuts and puncture wounds Cleaning equipment | <ul style="list-style-type: none"> Enforce Jacobs CS/SOP 10.2: Small Tools and Equipment Fall protection above 5 feet elevation Training, enforce Jacobs CS/SOP 7.8: Fall Protection Policy Enforce Jacobs CS/SOP 9.0: Shop and Storage Area Controls Training, hard hat program Enforce Jacobs EH&S/SOP 7.4: Biological Hazard Control, following operative instructions and training |

TABLE 3-2**Physical Hazards and Controls**

| Hazard | Engineering or Administrative Controls |
|------------------------------------|---|
| Flying debris/objects | Provide shielding and PPE. An emergency eye wash and shower must be available at work location. |
| Noise > 85 dBA | Noise protection and sound level monitoring are required. Also refer to Appendix D. |
| Steep terrain/unstable surface | Brace and shore equipment. |
| Explosive gases | Provide 20-pound A:B:C fire extinguishers or equivalent, plus ventilation. Stop work when readings are greater than 10 percent of the lower explosive limit (LEL) and notify SHSC or PHSM. |
| Static electricity | Make certain there are no spark sources within 50 feet of an excavation, heavy equipment, or UST removal. Bonding and grounding are required when filling or removing flammable liquids from containers such as tanks or drums. |
| Gas cylinders | Make certain that gas cylinders are properly anchored, chained, and capped. Keep cylinders away from ignition sources and protected from direct sunlight. |
| High-pressure hose rupture | Check that fittings and pressurized lines are in good repair before using. Secure all lines to prevent whipping. |
| Electrical shock | Make certain that equipment is properly grounded. Do not modify electrical wiring unless qualified to do so. Follow lock-out/tag-out procedures discussed in Appendix D. |
| Underground utilities | Follow Jacobs SOP 7.7 (EH&S Manual), which requires hand augering to 7 feet and overreaming all drill holes, and probing all areas to be excavated with a nonconductive pole. Complete the Clearance Form found in SOP 7.7. |
| Overhead electrical wires | Heavy equipment must remain at least 15 feet from overhead powerlines of 50 kV or less. For each kV over 50, increase distance 0.5 foot. |
| Muddy, wet, or slippery work areas | Use wood pallets or similar devices in muddy work areas. Avoid these areas whenever possible. |
| Back injury | Use proper lifting techniques. Use mechanical lifting aids whenever possible. |
| Protruding objects | Flag and/or pad visible objects. Flatten or remove all protruding spikes, nails, and other sharp objects that may cause injury. |

TABLE 3-3
Suspected Contaminants at Fuel Hydrant System

| SUSPECTED CONTAMINANTS |
|--------------------------------------|
| Petroleum Oils and Lubricants |
| JP-4 |
| Diesel Fuel/Fuel |
| Gasoline |
| Benzene |
| Toluene |
| Xylene |
| Ethylbenzene |

TABLE 3-4

Hazardous Chemical Substances of Occupational Health Concern

Itemized below are chemical substances that may pose an occupational health threat upon exposure. For each chemical substance itemized, the following information is

summarized for quick reference:

- applicable allowable exposure limits
- limits when immediately dangerous to life or health (IDLH)
- ionization potential (IP)
- Generic chemical group (for reference to Appendices C and O)

CNS = central nervous system

FP = flash point

LEL = lower explosive limit

REL = recommended exposure limit

STEL = short-term exposure limit

TLV = threshold limit value

VP = vapor pressure

* F = degrees Fahrenheit

eV = electron volt

| CHEMICAL NAME | PEL/ TLV | OTHER LIMITS | CHEMICAL GROUP | WARNING PROPERTIES | PHYSICAL PROPERTIES | TARGET ORGANS | ACUTE/CHRONIC HEALTH EFFECTS | CANCER |
|--------------------------|-------------|----------------------------------|-----------------|-----------------------|---|--|--|--------|
| Kerosene (JP-4 and JP-5) | none | REL: 100 ppm | Petroleum based | odor threshold 20 ppm | LEL: 0.7% FP: 120° F | CNS, skin, respiratory system, kidneys, gastro-intestinal system | Chemical pneumonia | no |
| Benzene | 1/1 ppm | IDLH: 3,000 ppm STEL: 5 ppm | Petroleum based | aromatic odor | LEL: 1.3% IP: 9.25 eV VP: 75 mm FP: 120° F | blood, CNS, skin, bone marrow, eyes, respiratory system | Irritated eyes, nose, and respiratory system; headache; nausea; staggered gait; fatigue; lassitude; dermatitis; bone marrow depression; abdominal pain; leukemia | yes |
| Fuel-gas | 300/300 ppm | IDLH: 2,500-3,500 ppm | Petroleum based | sweet odor | LEL: 1.7% | skin, respiratory system | Irritating to eyes, nose, and throat; CNS | no |
| Toluene | 200/100 ppm | IDLH: 2,000 ppm | Petroleum based | aromatic odor | LEL: 1.2% IP: 8.921 eV VP: 22 mm FP: 40° F | CNS, liver, kidney, skin | Fatigue, weakness; confusion, euphoria, dizziness; headache; dilated pupils, lacrimation; nervousness; muscle fatigue; insomnia; paresthesia; dermatitis; photophobia | no |
| Xylene | 100/100 ppm | IDLH: 1,000 ppm STEL: 150 ppm | Petroleum based | aromatic odor | LEL: 1.1% IP: 8.6 eV VP: 7 mm FP: 83° F | CNS, eyes, gastro-intestinal tract, blood, liver, kidneys, skin | Dizziness, excitement, drowsiness, incoordination, staggering gait; irritating eyes, nose, throat; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis | no |

Note: Anyone bringing chemicals to this site is required to provide an MSDS to the PHSM or Site Manager.

3.4 BIOLOGICAL HAZARDS AND CONTROLS

There is potential for bites from insects, snakes, and rodents, as well as possible contact with poisonous plants. More detailed information concerning biological hazards and controls are provided in Appendix D.

3.5 HEAT AND COLD STRESS

The Jacobs Environmental Health and Safety Manual, SOPs 7.1 and 7.2, outline exposure control methods for working in extreme temperatures. The guidance contained in these SOPs is summarized in Appendix D. SOPs 7.1 and 7.2 should be consulted for details. Table 3-6 summarizes symptoms and treatment procedures for heat and cold stress.

3.6 RADIOLOGICAL HAZARDS

The presence of radiological hazards at the Fuel Hydrant System is not expected.

3.7 CONFINED SPACE HAZARD

The fieldwork (trenching) to be conducted may be classified as confined space entry. At this time, no one is authorized to enter tanks or excavations greater than 4 feet deep. If entry is necessary then an amendment will be written.

TABLE 3-5
Generic Chemicals That May Be Brought Onsite

| Chemical | Generic Chemical Hazard Group |
|--|-------------------------------|
| Methanol | Solvents (nonhalogenated) |
| Hexane | Solvents (nonhalogenated) |
| Calibration Gases | Various |
| Immunoassay Test Kit Reagents ¹ | Various |

¹ At the time this HSP was written, the chemicals necessary for immunoassay test kit reagents had not been determined.

TABLE 3-6
Symptoms and Treatment of Heat and Cold Stress

| Condition | Symptoms | Treatment |
|-----------------|---|--|
| Heat Stroke | Red, hot dry skin; no perspiration; dizziness; confusion; rapid breathing and pulse; high body temperature. | This is a MEDICAL EMERGENCY! Cool victim rapidly by soaking in cool (not cold) water. Loosen restrictive clothing. Get medical attention immediately! |
| Heat Exhaustion | Pale, clammy, moist skin; shallow breathing; profuse sweating; weakness; normal temperature; headache; dizziness; vomiting. | Move victim to a cool, air-conditioned area. Loosen clothing; place head in low position. Have victim drink cool (not cold) water. |
| Frostbite | Blanched, white, waxy skin, but tissue resilient; tissue cold and pale. | Move victim to a warm area. Warm affected area quickly in warm (not hot) water. Have victim drink warm fluids not coffee or alcohol. Do not break any blisters. Elevate the injured area and get medical attention. |
| Hypothermia | Shivering, apathy, sleepiness; rapid drop in body temperature; glassy stare; slow pulse; slow respiration. | Move victim to a warm area. Have victim drink warm fluids not coffee or alcohol. Get medical attention. |

4.0 SITE CONTROL

The following sections describe site control procedures and practices.

4.1 SITE CONTROL PROCEDURES

The Site Manager and SHSC have the following site control responsibilities:

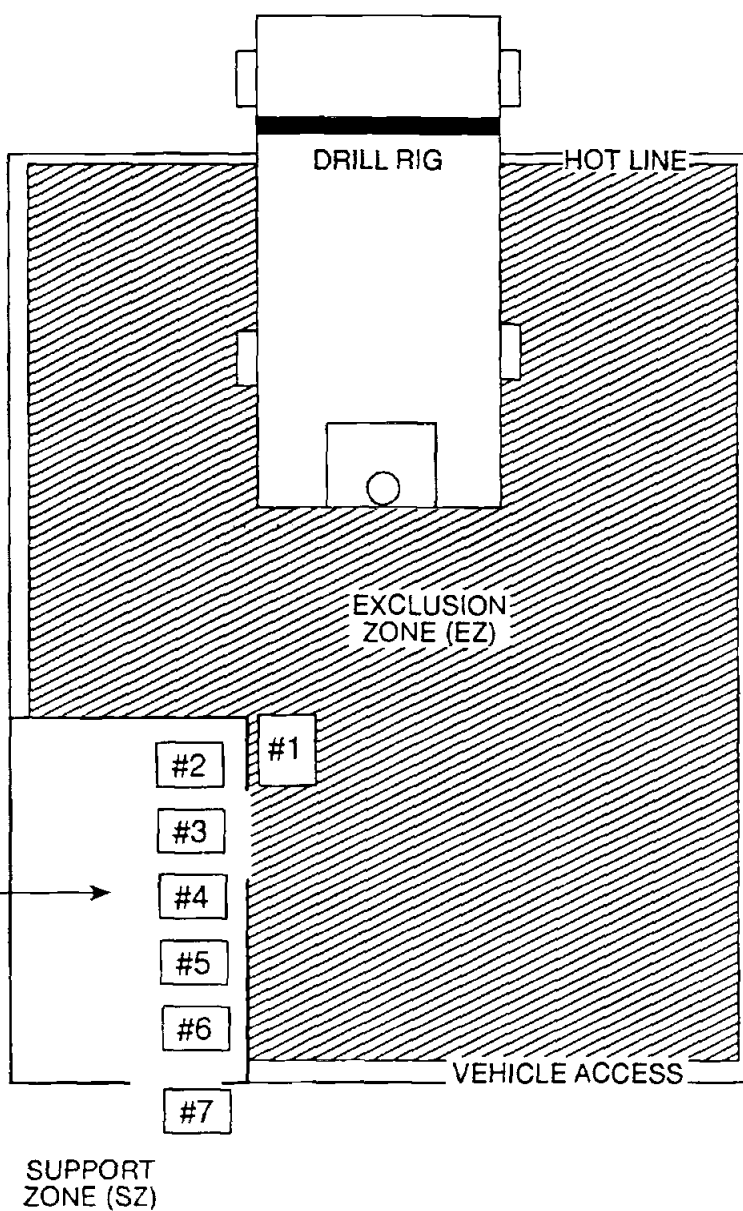
- Limit access to the sampling location(s) and post appropriate warning signs or caution tape.
- Ensure "buddy system" requirements of 29 CFR 1910.120 are followed.
- Keep a copy of this HSP readily available.
- Establish onsite communications. These should consist of the following:
 - line of sight;
 - agreed-upon hand signals or two-way radio; and
 - air horn.
- Establish offsite communications using two-way radio and/or telephone.
- Set a wind indicator to readily determine wind direction.
- Establish and delineate contiguous work zones (exclusion, contamination reduction, and support) per Figure 4-1. The latter two zones should be upwind of the exclusion zone unless obstacles make it infeasible.
- Establish decontamination and waste disposal procedures.

WIND
DIRECTION



Numbered Stations
Are Listed in
Table 4-1

CONTAMINATION
REDUCTION
ZONE (CRZ)



NO SCALE

NOTE: Field modifications of decontamination layout are typically based on wind direction, access to the site, and placement of the drill rig.

FIGURE 4-1
Typical Site Control Layout
NAS Fort Worth
Fort Worth, Texas

4.2 WORK PRACTICES

All personnel will be responsible for compliance with the following work practices:

- Post Occupational Safety and Health Administration (OSHA) and other agency posters in a central and conspicuous location. (Refer to Section 9.2 for more details.)
- Suspend field operations if any unforeseen hazards become apparent in the field that require greater precautions other than those specified in the HSP. (These are responsibilities for the PHSM or Site Manager.)
- Meet the "buddy system" (working in teams of two people) requirements of 29 CFR 1910.120(d)(3) at all times.
- Maintain a copy of the site tailgate and exclusion zone entry log (Appendix E).
- Implement dust- or vapor-suppression methods to minimize unwanted emissions.
- Position all personnel upwind of sampling locations.
- Avoid visibly contaminated areas as much as possible place barriers or plastic to mark location.
- Prohibit eating, drinking, or smoking in exclusion zones or contamination reduction zones where access is restricted.
- Establish areas for eating, drinking, and smoking. Drinking water, juices, and cups are to be supplied in the support area.
- Store chemicals brought onsite in properly labeled containers and where they are unlikely to be accidentally disturbed.

- Perform work during daylight hours. (Night work requires modification to this HSP.)
- If toilet facilities are not located within a three-minute walk from the decontamination area, either provide a chemical toilet and hand-washing facility, or have a vehicle available (not the emergency vehicle) for transport to nearby facilities.

A copy of the HSP must be available in the control zone or the vehicle designated for emergencies.

4.3 DECONTAMINATION PROCEDURES

The following sections describe decontamination procedures for equipment and personnel.

4.3.1 Samples and Equipment

The PHSM or Site Manager shall verify that pieces of equipment going offsite are properly decontaminated according to the procedures outlined below. Decontamination must be documented in the field logbook that is a part of the permanent project file.

- Sampling Equipment. Follow detailed procedures in Appendix H.
- Samples. Wipe exterior of sample containers to remove visible contamination.
- Heavy Equipment. Scrape off dirt. Steam clean at the decontamination pad before moving to another site.
- Vehicles. Vehicles driven within the boundaries of the sites must be washed and the interior vacuumed before returning the vehicle to the office, rental agency, or to any person not named in this HSP. A commercial car wash is adequate for this purpose. Vehicles driven in the exclusion zone, extended into a part of the exclusion zone, or used to transport contaminated personnel or supplies must be steam cleaned inside and

outside at the decontamination pad before going to another site. Vehicles do not have to be decontaminated between boreholes.

4.3.2 Personnel

Personnel decontamination procedures will depend on the level of PPE worn in the field.

Level D and D+ Personal Protective Equipment. Wash and rinse gloves and boots with soap and water. Remove and dispose of gloves and coveralls. Wash hands and face with soap and water. Figure 4-2 outlines a typical Level D and D+ decontamination layout.

Levels B and C Personal Protective Equipment. A decontamination schematic is provided in Figure 4-3; procedural details are described in Table 4-1.

4.4 SPILL CONTAINMENT PROCEDURES

Refer to the most current edition of the U.S. Department of Transportation (DOT) Emergency Response Guide Book (DOT P 5800.5), and to the Jacobs Environmental Cleanup Plan for this project.

The following are potential spills sources during field operations: hydraulic oil from vehicles, contaminated soils from drilling, decontamination liquids, and residual fuels from USTs or fuel lines. Containerizing materials as soon as possible will reduce the potential for spills. Handling of waste materials and containers will be in accordance with the Environmental Cleanup Plan developed for NAS Fort Worth.

If spills occur, the PHSM and Site Manager are to be notified immediately. The PHSM or Site Manager will be responsible for ensuring necessary notifications are given to the PHSD and the AFCEE representative. The AFCEE representative will inform the station emergency responders if necessary. The AFCEE representative and Jacobs will determine the strategy for notifying regulatory agencies.

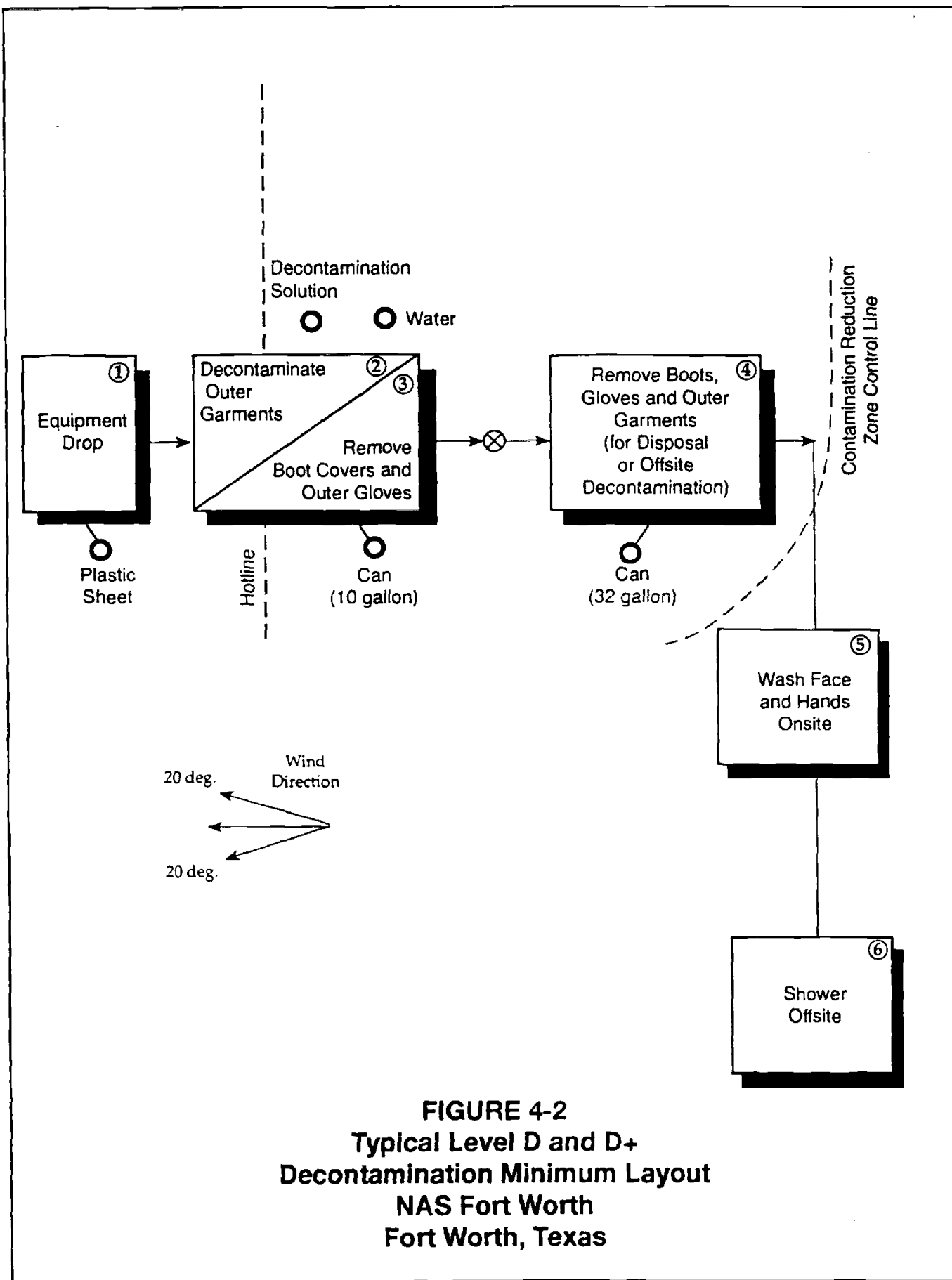


FIGURE 4-2
Typical Level D and D+
Decontamination Minimum Layout
NAS Fort Worth
Fort Worth, Texas

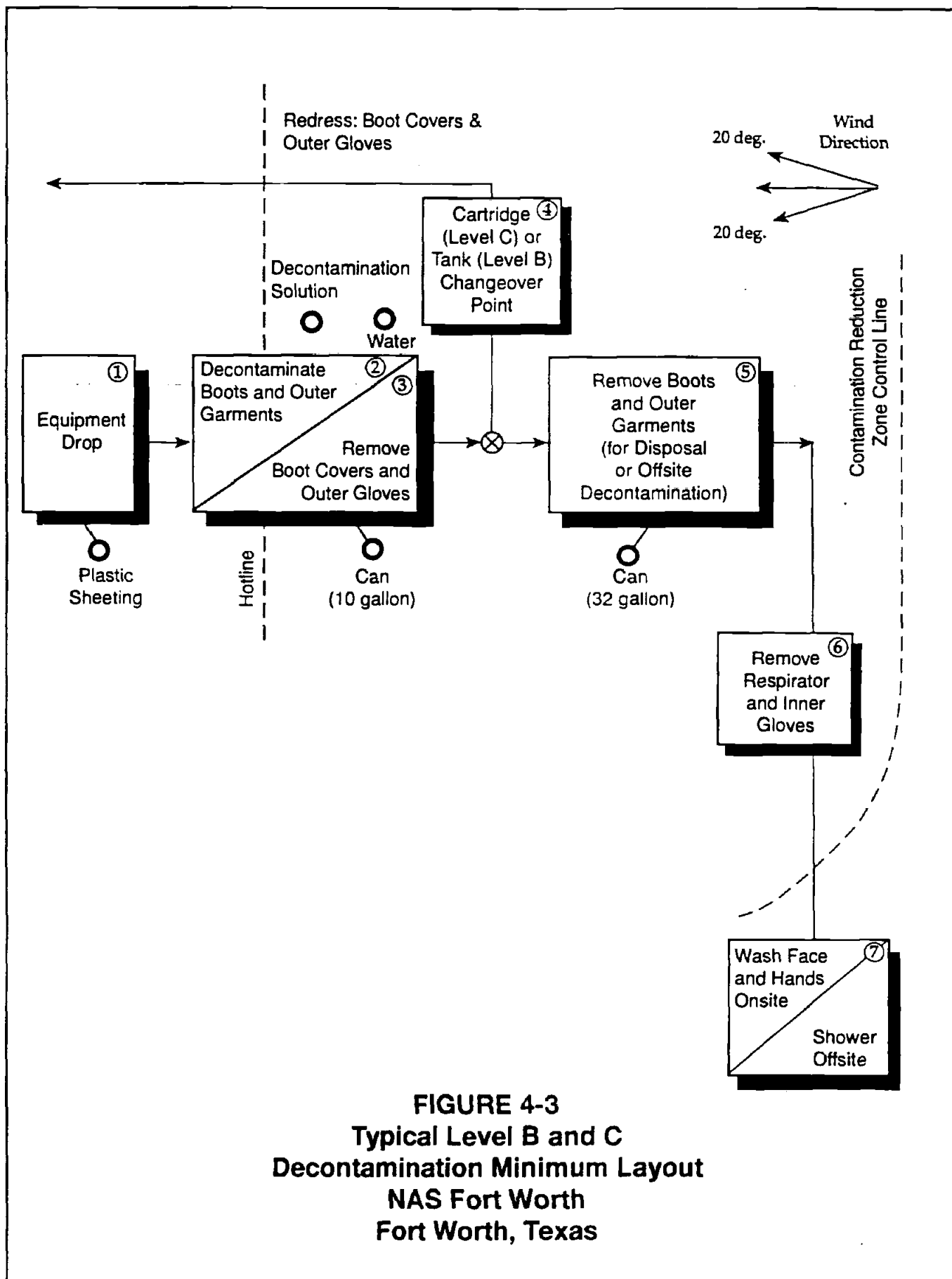


FIGURE 4-3
Typical Level B and C
Decontamination Minimum Layout
NAS Fort Worth
Fort Worth, Texas

TABLE 4-1

Decontamination Procedures

| Station | Procedure | Equipment and Supplies |
|--|---|--|
| 1. Equipment drop | Deposit equipment used onsite (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool-down station may be set up within this area. | a) various size containers b) plastic liners and drop cloths |
| 2. Wash outer garments and boots | Scrub outer boots, outer gloves, and splash suit with an aqueous solution of Alconox [®] or other nonphosphate detergent. Rinse with copious amounts of water. Remove tape. | a) containers (20- to 30-gallon) b) decontamination solution (Alconox [®] or other non-phosphate detergent) c) rinse water d) two to three long-handled, soft-bristled brushes |
| 3. Remove outer boots and gloves | Remove outer boots and gloves. Deposit them in a plastic-lined container. | a) containers (20- to 30-gallon) b) plastic liners c) benches or stools and tables |
| 4. Change air tank (Level B) or respirator cartridge (Level C) | If a worker leaves the exclusion zone to change the air tank or respirator cartridge, this is the last step in the decontamination procedure. Exchange air tank or respirator cartridge, don new outer gloves and boot covers, tape joints, and return to duty. | a) air tanks or respirator and cartridges, depending on level of protection b) tape c) boot covers d) gloves |
| 5. Remove boots and outer garments | Remove boots, chemical-resistant splash suit, and outer garments and deposit in separate plastic-lined containers. | a) containers (20- to 30-gallon) b) plastic liners c) benches or stools and tables |

The following materials and equipment will be available for spill containment:

- additional drums;
- drum-patching kit;
- absorbent materials (granular, rolls, sheets, booms etc.),
- shovels and towels; and
- plastic sheeting.

4.5 DISPOSAL OF WASTE MATERIALS GENERATED ONSITE

Any site-derived materials such as decontamination fluids and soil samples shall be contained in separate 55-gallon drums, roll-off containers, or wastewater holding tanks. All PPE shall be contained in plastic bags and labeled with the site location. All containers will be inventoried and moved to the temporary staging area designated by the station POC. Containers and/or roll-off bins may not be transported offsite for disposal until analytical results of samples collected at the boreholes have been received and the container contents have been classified.

Hazardous waste containers shall be transported by a registered hauler to a permitted treatment, storage, and disposal facility (TSDF). NAS Fort Worth representatives must sign hazardous waste manifests. Solid trash and PPE that has been contaminated shall also be disposed of as hazardous waste.

Solid trash, i.e., disposable PPE and items used in the work zones that are not contaminated at concentrations sufficient to be classified as hazardous waste, shall be contained and disposed of as industrial solid waste with other trash generated at NAS Fort Worth.

Soils that are not classified as hazardous waste will be disposed of as designated by NAS Fort Worth.

5.0 AIR MONITORING

Air monitoring will be conducted to prevent exposure to dust or hazardous chemicals, as described below.

5.1 ENVIRONMENTAL MONITORING

Air monitoring is required for work activities that disturb soil. Air monitoring during these intrusive activities shall be performed with a screening or direct reading instrument such as the organic vapor analyzer (OVA) 128 or PID (HNU) PI 101, a combustible gas indicator (CGI), an oxygen (O₂) analyzer and colorimetric tubes for specific compounds. Calibration specifications for instruments are displayed in Table 5-1. The monitoring frequency and action levels are contained in Table 5-2. Appendix I contains forms for recording air monitoring results and calibration data.

5.2 PERSONAL EXPOSURE MONITORING

If elevated levels of specific substances are detected using the colorimetric tubes or other instruments listed in Table 5-2, the PHSM shall be notified so that an evaluation can be made to determine whether personal monitoring will be performed.

If personal monitoring is performed, it shall be in accordance with the NIOSH standardized sampling and analytical methods or other equivalent methods. These methods specify quality assurance procedures for calibration, sample media, collection parameters, sampling, and analysis of samples. Samples shall be analyzed by a laboratory accredited by the American Industrial Hygiene Association (AIHA).

Personal air monitoring shall be documented and maintained in an employee's personnel file and in the site project files. Employees monitored shall receive a copy of the sampling results. The air monitoring record form is included in Appendix I.

TABLE 5-1
Calibration Specification

| Instrument | Gas | Span | Reading | Method |
|---|--|----------|---|--|
| PID: Hnu P1 101 (10.2 eV probe) ⁽¹⁾ | 100 ppm isobutylene | 9.8 ± 33 | 55 ppm | 1.5 L/min reg. T-tubing or 0.25 L/min reg. direct tubing |
| CGI: MSA 260, 261, 360, or 361 | For pentane: 0.75% or for hexane: 0.3% or for methane: 1.24% | N/A | For pentane: 50% ±5% LEL or for hexane: 27% ±5% LEL or for methane: 26% ±5% LEL | 1.5 L/min reg. direct tubing |

Notes:

⁽¹⁾ = typically, the probe chosen

CGI = combustible gas indicator
eV = electron volt
LEL = lower explosive limit
L/min = liters per minute
MSA = Mine Safety Appliance
N/A = not applicable
OVA = organic vapor analyzer
PID = photoionization detector
ppm = parts per million
reg. = regulator
± = plus or minus
% = percent

Note: Manufacturer's instruction or operating manual shall be available at site.

TABLE 5-2

Equipment Specification and Action Levels

| Instrument | Tasks | Action Levels | Frequency ¹ | Calibration ² |
|---|--|--|---|--------------------------|
| PD: H ₂ N ₂ (10.2 or 11.7 eV or equivalent) | Removal of Tanks and Piping | 0-5.0 ppm ^{ab} >5.0-100 ppm ^{ab} >100-500 ppm ^{ab} >500 ppm ^{ab} Stop work; reevaluate | In the breathing zone at the beginning of operations and a minimum of every 30 minutes. Levels C and B require continuous monitoring. | Daily - Pre and Post Use |
| Colorimetric Tubes: Benzene | Removal of Tanks and Piping | 0-1.0 ppm ^{ab} >1-5 ppm ^{ab} >5-50 ppm ^{ab} >50 ppm ^{ab} Stop work; reevaluate | When H ₂ N ₂ readings exceed 5.0 ppm in the breathing zone and every 15 minutes while readings are sustained. | Daily - Pre and Post Use |
| Combustible Gas Meter | Removal of Tanks and Piping | 0 < 10% LEL ≥ 10% LEL Level D (potential explosion hazard) Stop work; reevaluate (explosion hazard) | Continuous monitoring during tank and piping removal. Continuous monitoring of a confined space. Screening during excavating or before entering an excavation/trench. | Daily - Pre and Post Use |
| Heat Stress Monitor and Physiological Monitor | When PPE is Worn or Elevated Temperatures | Reference Subsection 3.5 and Appendix F of this document | Per Subsection 3.5 and Appendix F | Not Applicable |
| Noise Level Monitor ³ | All Tasks | Noise measurements are required when voice must be raised to communicate at a distance of 3 feet or less | Initial measurement and at 30 minute intervals while readings are above 85 dBA. | Daily - Pre and Post Use |
| Oxygen Meter | Tank Removals When Excavations ≥ 4 feet deep | 19.5% - 23.5% <19.5% >23.5% Level D & C Level B Stop work; reevaluate | Continuously during a confined space entry. Screening prior to entering an excavation/trench. | Daily - Pre and Post Use |

1. Air monitoring shall be documented using Exposure Form in Appendix I.

2. Calibrations shall be documented using calibration log in Appendix I.

3. Requirement to wear hearing protection when within 20 feet or less of drilling/excavation etc. to eliminate the need for monitoring all tasks.

ab = above background

eV = electron volt

LEL = lower explosive limit

PD = photolization detector

ppm = parts per million

References: ACGIH, 1994

NIOSH, 1985, 1990

29 CFR 1910

6.0 PERSONAL PROTECTIVE EQUIPMENT

PPE ensembles for waste site activities are defined by the U.S. Environmental Protection Agency (EPA) and OSHA. Level D consists of a basic work uniform and common construction-related PPE that includes a hard hat, steel-toed safety boots, and safety glasses with side shields. Other PPE, such as leather or cotton gloves, are added as necessary. Level D+ adds a limited amount of chemical protection for the skin. Over the work uniform, chemical-resistant overshoes or boots, a Tyvek suit, and chemical-resistant gloves are added.

Level C adds an air-purifying respirator and specialized whole body clothing such as a coated Tyvek suit and two pairs of chemical-resistant gloves. The ankles, wrists, and seams may be taped. Level B replaces the air purifying respirator with one that provides a supplied air source: either an airline/Cascade System or a self-contained breathing apparatus (SCBA). Level A includes a totally encapsulating chemical-resistant whole body suit. SCBA is generally worn for Level A. Table 6-1 summarizes the PPE ensembles that are required for this project by work task.

PPE levels may be upgraded or downgraded based on the results of direct reading air monitoring equipment. Table 6-2 summarizes conditions that require an upgrade or that may indicate that a downgrade is possible.

PPE will be inspected and tested as required in Jacobs SOPs. Respirators will be inspected after each use, or monthly, whichever is more frequent. Refer to Jacobs SOP 4.4 for respiration inspection procedures. SCBA equipment will be tested following procedures in Jacobs SOP 4.5.

TABLE 6-1

Personal Protective Equipment Specifications

| Task | Level | Body | Foot (ANSI Z 41.1) | Head (ANSI Z 89.1) | Eye (ANSI Z 87.1) | Hand | Respirator (ANSI Z 94.1) | Hearing Protection |
|---|-------|---|--|-----------------------|-----------------------------|---|---|---|
| Minimum for field work outside EZ and CRZ | D | • None required | • Steel toe/shank with safety shoes/boots | • Hard hat | • Safety glasses | • Work gloves may be used | • None required | <ul style="list-style-type: none"> • Within 20 feet of noise source that exceeds 85 dBA • Usually when, at 13 feet apart in normal conversation, voices must be heard to be heard |
| All, as determined by at monitoring results | D+ | • Disposable Tyvek coveralls OR disposable polyethylene (PE) coated Tyvek coveralls | • Steel toe/shank with safety boots with Tyvek, neoprene, or nitrile boot covers OR neoprene or nitrile boots with steel toe/shank | • Hard hat | • Safety glasses or goggles | <ul style="list-style-type: none"> • Inner Gloves: N-Dex, Nitrile OR Latex Rubber • Outer Gloves: Nitrile | • None required | <ul style="list-style-type: none"> • Within 20 feet of noise source that exceeds 85 dBA • Usually when, at 13 feet apart in normal conversation, voices must be heard to be heard |
| All, as determined by at monitoring results | C | • Same as Level D+ | • Steel toe/shank with safety boots with Tyvek, neoprene, or nitrile boot covers OR neoprene or nitrile boots with steel toe/shank | • Hard hat | | <ul style="list-style-type: none"> • Inner Gloves: N-Dex, Nitrile OR Latex Rubber • Outer Gloves: Nitrile | <ul style="list-style-type: none"> • Full face air purifying respirator, North 7800-BA or equivalent, equipped with cartridges for protection against organic vapors, acid gases, dusts, fumes, and mists • (Optional) Full face Powered Air Purifying Respirator (PAPR) with same cartridges as above. | <ul style="list-style-type: none"> • Within 20 feet of noise source that exceeds 85 dBA • Usually when, at 13 feet apart in normal conversation, voices must be heard to be heard |
| All, as determined by at monitoring results | B | • Limited use chemical, biological or responder suits | • Neoprene OR nitrile boots with steel shank | • Hard hat | | <ul style="list-style-type: none"> • Inner Gloves: N-Dex, Nitrile OR Latex Rubber • Outer Gloves: Nitrile | <ul style="list-style-type: none"> • Full face pressure demand air filter or self-contained breathing apparatus with Gas de D or better breathing air for either respiratory system used. | <ul style="list-style-type: none"> • Within 20 feet of noise source that exceeds 85 dBA • Usually when, at 13 feet apart in normal conversation, voices must be heard to be heard |

Notes:

dBA = decibels on the A-weighted scale

CRZ = contamination reduction zone

EZ = exclusion zone

PE = polyethylene

TABLE 6-2
Reasons to Upgrade or Downgrade Level of Protection

| Upgrade | Downgrade |
|---|--|
| <ul style="list-style-type: none"> • Request of individual performing task. • Change in work task that will increase contact or potential contact with hazardous materials. • Occurrence or likely occurrence of gas or vapor emission. • Known or suspected presence of dermal hazards. • Personnel air monitoring results exceed 100 x PEL while full face respirator is worn. • Action levels described in Table 5-2 exceeded. | <ul style="list-style-type: none"> • New information indicating that situation is less hazardous than originally thought. • Change in site conditions that decreases the hazard. • Change in work task that will reduce contact with hazardous materials. |

PEL = permissible exposure limit

7.0 EMERGENCY RESPONSE/CONTINGENCY PLAN

The following sections describe emergency response activities

7.1 EMERGENCY PLANNING

The PHSM or Site Manager performs the applicable emergency planning tasks before starting field activities and coordinates emergency response with the facility and local emergency service providers as appropriate. The PHSM or Site Manager is responsible for the following:

- evaluates and documents capabilities of local NAS Fort Worth emergency response teams, if any;
- verifies local emergency contacts, hospital routes, evacuation routes, and assembly points;
- notifies appropriate emergency responders listed in Section 7.6 before site mobilization;
- confirms and post(s) emergency telephone numbers and route to hospital;
- posts site map marked with location of emergency equipment and supplies;
- drives and verifies route to hospital; ensures employees drive route to hospital;
- designates one vehicle as the emergency vehicle; places a copy of this HSP, including the hospital directions and map, inside; keeps keys in ignition during field activities;
- inventories and checks site emergency equipment and supplies;

- establishes emergency signals, evacuation routes, and onsite and offsite assembly points;
- reviews emergency procedures for personnel injury (Section 7.3);
- reviews names of onsite personnel trained in first aid and CPR;
- reviews emergency response and post-emergency notification procedures;
- rehearses the emergency response plan once, before site activities;
- points out to field team members where emergency response equipment is located in the support area;
- briefs new workers on the emergency response plan; and
- refers also to Figure 7-1, which shows a typical emergency response operations flow diagram.

7.2 EMERGENCY EQUIPMENT AND SUPPLIES

The following emergency equipment and supplies will be kept onsite:

- 20-pound A:B:C fire extinguisher (or equivalent);
- industrial first aid kit (10-unit minimum);
- one-way breathing shield for CPR;
- stretcher or blanket;
- water and electrolyte replenishers (Gatorade®, etc.);
- two-way radio(s) or cellular phone;
- tympanic (ear) thermometer (optional);
- digital pulse meter (optional);

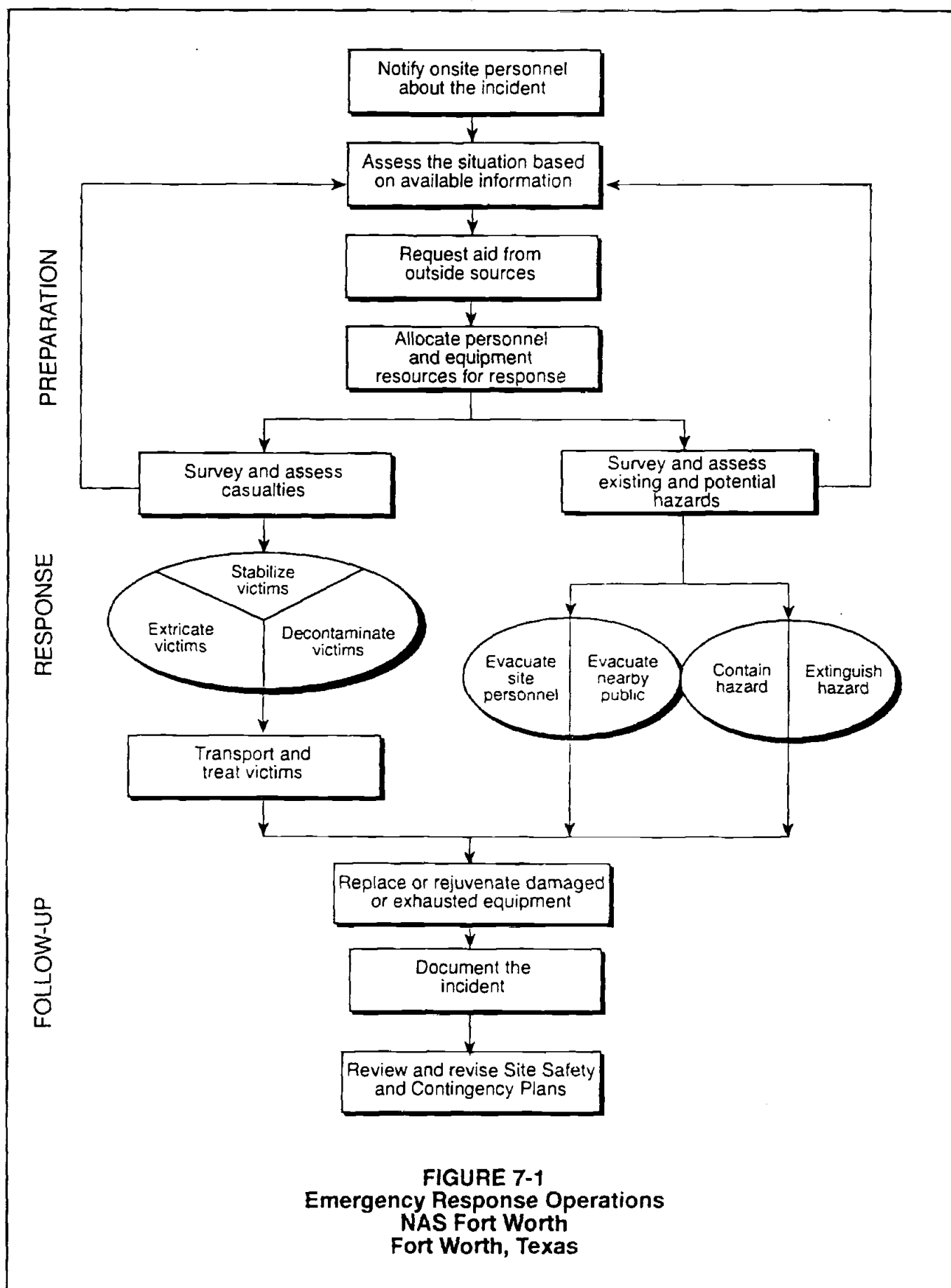


FIGURE 7-1
Emergency Response Operations
NAS Fort Worth
Fort Worth, Texas

- air horn;
- wind direction indicator;
- portable pressurized eyewash/shower; and
- sorbent material or spill containment supplies.

7.3 EMERGENCY PROCEDURES

The following procedures will be followed during a site emergency.

7.3.1 Emergency Medical Treatment

If a medical emergency occurs, the PHSM, SHSC, or Site Manager shall assume charge until ambulance arrives, or until injured person is admitted to the emergency room.

Site personnel will prevent further injury by completing the actions listed below:

- Initiate first aid and CPR if certified. Refer to Section 7.4 for information on the bloodborne pathogen provision.
- Call ambulance and hospital as appropriate. Arrange with NAS Fort Worth for entry procedures.
- Determine if decontamination will make injury worse. If yes, seek medical treatment immediately.
- Make certain the injured person is accompanied to the emergency room by at least one field team member with the same employer.

Hospital emergency personnel will be provided with a copy of the HSP. An Authorization for Medical Treatment Form (Appendix J) shall be taken with the injured employee to the medical facility. The top portion of the form is completed by the PHSM or Site Manager,

and the bottom portion is completed by the doctor at the medical facility. The completed form shall be forwarded as listed in Section 7.7.

7.3.2 Fire

Upon notification of a fire onsite, all site personnel will assemble at the decontamination line. The fire department will be alerted, and all personnel will move to a safe distance from the involved area.

7.3.3 Personal Protective Equipment Failure

If any site worker experiences a failure or alteration of PPE, that person and his/her buddy will immediately leave the exclusion zone through the decontamination line. Reentry will not be permitted until the equipment has been repaired or replaced.

7.3.4 Other Equipment Failure

If any other equipment on site fails to operate properly, the PHSM or SHSC will be notified and will determine the effect of this failure on continuing operations onsite. If the failure affects the safety of personnel or prevents completion of the work plan tasks, all personnel will leave the exclusion zone until the situation is evaluated and appropriate actions are taken.

7.3.5 Spills

Section 4.4 discusses measures to be taken if a spill occurs.

7.4 BLOODBORNE PATHOGEN PROVISION

The following procedures will be followed if a potential exposure to bloodborne pathogens occurs:

- A Hepatitis B vaccination must be offered to all employees who have occupational exposure to blood or other potentially infectious materials.
- The PHSM or Site Manager must be notified immediately during the work shift when a first aid incident occurs.
- The PHSM or Site Manager shall follow the required reporting procedures to the PHSD as listed in Section 7.7.
- The report shall include the names of all first aid providers who rendered assistance, regardless of whether PPE was used, and shall describe the first aid incident, including time and date.
- The description must include a determination if, in addition to the presence of blood or other potentially infectious material, an "exposure incident" (as defined by 29 CFR 1910.1030) occurred. This determination is necessary to ensure that the proper postexposure evaluation, prophylaxis, and follow-up procedures required by Bloodborne Pathogen SOP are made available immediately if there has been an "exposure incident" as defined by 29 CFR 1910.1030.
- The report shall be recorded on the First Aid Register (Appendix J).
- A one-way mouth shield must be included in or with all field first aid kits for use in CPR application to prevent transmission of body fluid between victim and rescuer.

For additional information, refer to SOP 7.6 in the Jacobs EH&S Manual (Jacobs undated a).

7.5 EVACUATION

If an evacuation is necessary, the steps below shall be followed:

- Personnel are to leave the work location (upwind) and assemble at a designated assembly point (if safe) upon detecting the emergency signal for evacuation.
- If an emergency situation is of concern to local station personnel, notify the local station contact(s) of the emergency situation.
- If appropriate and safe, the PHSM or SHSC and a "buddy" are to remain at or near the sampling location after the location has been evacuated to assist local responders and advise them of the nature and location of the incident.
- The PHSM, SHSC, or designee is to account for field team members at the assembly point.
- The PHSM, SHSC, or Site Manager is to complete an incident report (per Section 7.7) as soon as possible after occurrence.

7.5.1 Evacuation Routes and Assembly Points

Evacuation routes and assembly points will be documented by the PHSM or Site Manager during the employee health and safety briefing and daily tailgate meetings.

7.5.2 Hospital Location and Information

The station hospital is closed for use by site personnel. The following is hospital location and information:

- The Harris Methodist Fort Worth Hospital is the initial primary care facility in case of an accident. The hospital is located at 1300 Pennsylvania Avenue, Fort Worth, Texas 76104.

– Hospital: (817) 882-2000

– Emergency Room: (817) 882-2000

– Route to

Hospital: Refer to Figure 7-2.

– Distance: Approximately 12 miles

– Directions: From NAS Fort Worth, take Highway 183 south to I-30 east. Exit at Henderson Street. Proceed south on Henderson Street to Pennsylvania Avenue. The hospital is on the corner of 6th Street and Pennsylvania Avenue.

7.6 EMERGENCY RESPONSE CONTACTS

Police: 911

Fire: 911

Ambulance: 911

Poison Control Center: 1 (800) 458-5842

CHEMTREC: 1 (800) 424-9300

Note: These phone numbers will be verified.

Jacobs Emergency Medical Consultant: Dr. Zavon(513) 421-3063

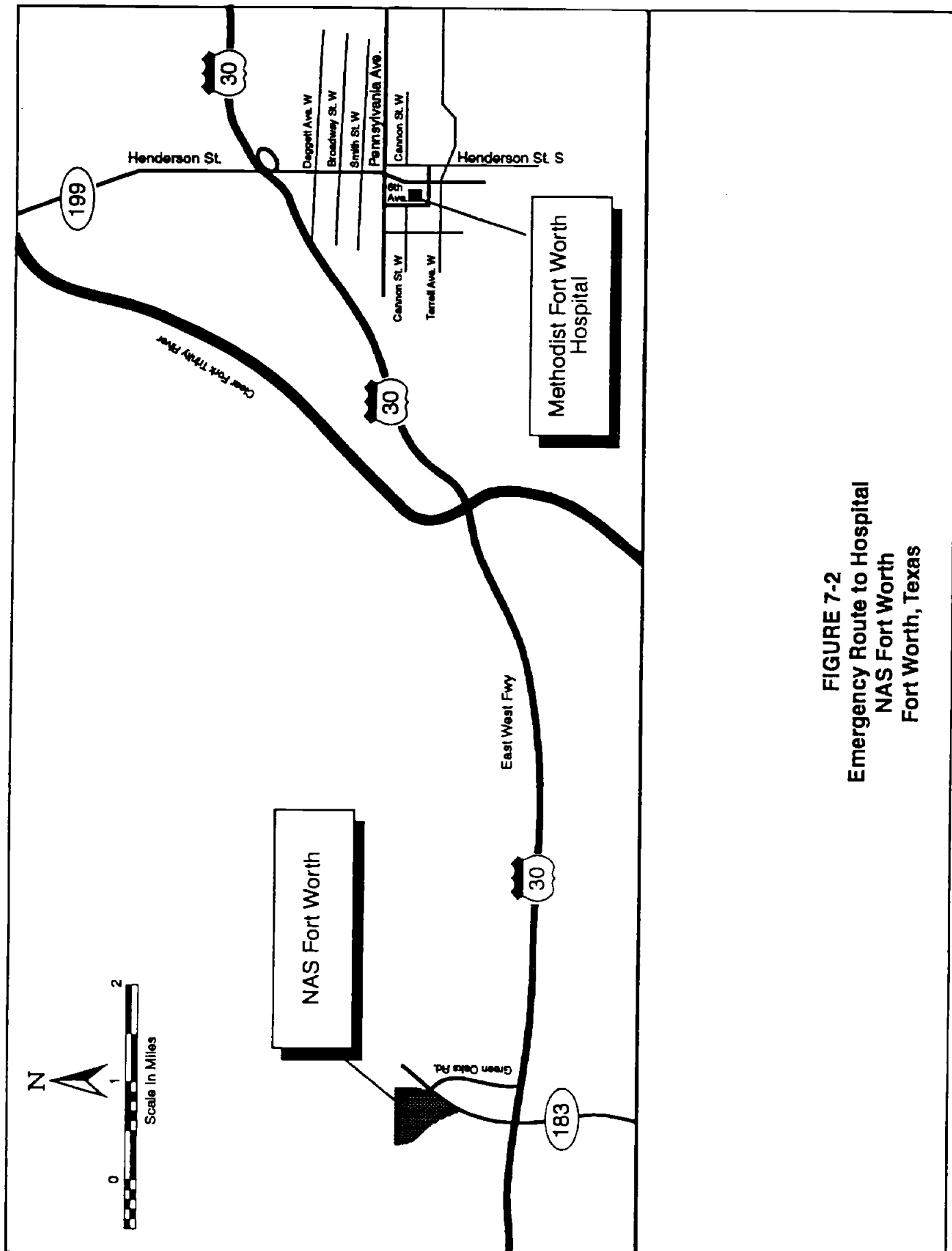


FIGURE 7-2
Emergency Route to Hospital
NAS Fort Worth
Fort Worth, Texas

7.7 POSTINCIDENT OR EMERGENCY NOTIFICATIONS AND RECORD KEEPING

As soon as possible following an accidental incident or emergency, the PHSM or Site Manager, or designee, is to directly notify the PHSD, the PjM, who will notify AFCEE, and the Health and Safety Manager of employee(s) involved. Refer to SOP 9.1 in the EH&S Manual (Jacobs undated a).

The PHSM or Site Manager should be prepared to provide the following information:

- PHSM's name;
- Site Manager's name;
- station name and project number;
- exact location of incident;
- name and employer of victim(s);
- nature and extent of injuries;
- whether victim(s) was transported offsite for medical treatment; and
- telephone number where PHSM can be contacted during next 24 hours.

Refer to Appendix J for details of all other requirements within the Jacobs SOP for Accident Investigation and Notification.

7.8 VEHICLE ACCIDENT PROCEDURE

If a vehicle accident occurs, take the following steps:

1. Stop immediately.
2. Take steps to prevent another accident (safety cones, reflectors, flares, etc.).

3. Call a doctor or ambulance if necessary:

Paramedics: 911; and
Hospital: (817) 882-2000.

4. Notify police at 911.

5. DO NOT sign any papers or make any statement as to who was at fault (except to your supervisor or a federal government investigator).

6. Notify or page PHSM within 24 hours.

7. Complete the required forms, listed below, and submit them to the PHSM as soon as possible.

- Operator's Report of Motor Vehicle Accident with Privacy Act (required) (Appendix J);
- Investigative Report of Motor Vehicle Accident (required). Must be signed by supervisor (Appendix J);
- Statement of Witness (required from each witness, if any) (Appendix J);
- invoices, which includes towing charges, if any, and estimates as requested; and
- information exchange, includes information about third-party driver and government driver.

8. Submit any other forms or documents (policy reports, third party claims, etc.) to the PHSM.

9. If damages occurred when vehicle was unattended (hit and run, etc.) or if incident did not involve another vehicle and there is no personal property damage or injuries, the driver of the vehicle must complete all forms.

For additional information, refer to SOP 9.1 in the EH&S Manual (Jacobs undated a).

8.0 RECORD KEEPING

OSHA and Jacobs team record keeping requirements will be met. Jacobs team personnel are also required to maintain logs and daily reports (e.g., training logs, calibration logs, and daily tailgate information). The following forms are provided as attachments to this HSP and shall be maintained as documentation for demonstrating adherence to the HSP. (Refer also to Jacobs SOP 9.1 and EH&S Manual.)

- Appendix A Employee Signoff;
- Appendix B Hazard Communication Forms;
- Appendix E Site Tailgate Meeting and Exclusion Zone Entry Log;
- Appendix F Visitor's Log Safety Meeting Form;
- Appendix I Health and Safety Forms, including the following:
 - Employee Physiological Monitoring Record for Heat Stress;
 - H&S Exposure Monitoring Log;
 - Field Calibration Log; and
 - Air Monitoring Record Form.
- Appendix J Accident Investigation and Notification.

9.0 SITE POSTINGS

The PHSM or Site Manager shall arrange to have all health and safety, and human resources posters and information conspicuously posted in a central location at the Jacobs field office. These shall include those listed below:

- Jacobs forms, including First Aid Register (Appendix J) and emergency phone numbers.
- OSHA forms and postings, including the following:
 - OSHA 200 Log (see Appendix J);
 - OSHA Safety and Health Poster;
 - Access to Medical and Exposure Records;
 - Forklift Operating Instructions; and
 - OSHA permits as applicable (excavations, scaffold erections, etc.).
- Human Resources forms and postings, including the following:
 - Notice of Workers' Compensation Insurance Provider;
 - Payroll Date Notification;
 - Equal Employment Opportunity is the Law;
 - Industrial Welfare Commission Order Regulating Wages;
 - Notice to Employees: Unemployment and Disability Poster;
 - Discrimination in Employment is Prohibited by Law;
 - Notice: Employee Polygraph Protection Act; and
 - Any other local required postings.

10.0 PLAN APPROVAL

This HSP has been written for use by the Jacobs team and any others who are authorized by the PHSM or Site Manager to access the Fuel Hydrant Site to conduct fieldwork in accordance with this HSP. This HSP is written for the specific site conditions, purposes, dates, and personnel specified and must be amended if these operations or conditions change.

Concurrence By:

Date:

Daniel D. Schuy For
Lynn Schuetter
Jacobs Project Manager

1/16/95

Concurrence By:

Date:

TBD
Project Health and Safety Manager

Plan Approved By:

Date:

Terry M. Briggs
Terry M. Briggs, Ph.D., CPH
Program Health and Safety Director
Jacobs Engineering Group Inc.

1/16/95

11.0 REFERENCES

- American Conference of Governmental Industrial Hygienists (ACGIH). 1994. *Threshold Limit Values and Biological Exposure Indices*. 1993-1994.
- Jacobs Engineering Group Inc. Undated a. *Corporate Health and Safety Manual for Environmental Field Programs*.
- Jacobs Engineering Group Inc. Undated b. *Corporate Safety Manual*.
- Maxim Engineers, Inc. 1990 (October). *Limited Subsurface Investigation Hydrant Fueling System Spot 35*.
- U.S. Air Force. 1993 (September). *Handbook for the Installation Restoration Program (IRP) Remedial Investigations and Feasibility Studies (RI/FS)*.
- U.S. Army Corps of Engineers. 1992 (October). *Safety and Health Requirements Manual*.
EM 385-1-1.
- U.S. Code of Federal Regulations (CFR) Title 29, Parts 1900 to 1910.999.
- U.S. Department of Health and Human Services. 1990 (June). *NIOSH Pocket Guide to Chemical Hazards*. Publication No. 90-117.
- U.S. Department of Health and Human Services. 1985 (October). *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*. Prepared by National Institute for Occupational Safety and Health (NIOSH), and U.S. Environmental Protection Agency (EPA), Washington, D.C.

Employee Signoff

[illegible]

**HAZARD COMMUNICATION
AND
RIGHT TO KNOW STANDARDS**

Name: _____ S.S. No.: _____

Company: _____

1. I have been informed about the Hazard Communication Program, Material Safety Data Sheets (MSDS), their use, location, and procedures for obtaining copies.
2. I have been informed that some of my work may involve exposure to toxic substances.
3. I have been informed about the right of employees to have access to relevant exposure and medical records, and the procedures for requesting access.
4. I understand that the employer must act upon a request in a reasonable amount of time to avoid the interruption of normal work operations but within 15 days.

Signature: _____

Date: _____

APPENDIX C

Generic Chemical Hazard Profiles

The following information is intended to be generic to provide a brief overview. Detailed information relevant to hazards associated with specific chemical substances of potential concern at this site are provided in Appendix G of this HSP.

Calibration Gases

Common pressurized gases used to calibrate air monitoring instrumentation include heptane, hexane, hydrogen, hydrogen sulfide, oxygen, and pentane. Under ambient conditions, these gases are flammable. The cylinders are pressurized; they can become mini-torpedoes if the valve stem is severed from the cylinder. Handle them carefully.

The primary routes of entry into the body are inhalation and skin absorption, so these substances should be handled in a well ventilated area. Symptoms of exposure include lightheadedness, nausea, headache, numb extremities, dermatitis, loss of appetite, chemical pneumonia, and giddiness. Exposure to elevated levels of such gases can damage the skin, eyes, and respiratory system, and can cause death.

Corrosives

Corrosives include acids, bases/caustics, and inorganic halogen salts. Some of the more common acids include acetic, citric, hydrochloric, hydrofluoric, nitric, perchloric, phosphoric, picric, and sulfuric acids. Some of the more common caustics include ammonia, ammonium hydroxide, potassium hydroxide, sodium hydroxide, and sodium hypochlorite. Inorganic halogen salts are compounds containing halogens (chlorine, bromine, fluorine) such as sodium chloride, potassium bromate, and sodium fluoride, which are corrosive to metals and finishes but are relatively insignificant health threats.

For the most part, corrosives are nonflammable, although the liquid forms are moderately to highly volatile. Perchloric acid (perchlorates) and picric acid when dry can be explosive.

The primary routes of entry into the body are by inhalation, ingestion, and skin contact. Symptoms of exposure include tissue burns, nose and throat inflammation, and pulmonary edema. Corrosives can cause extensive damage to the respiratory system, skin, and eyes.

Landfill Gases

In the past, landfills were often uncontrolled; almost any and every type of waste material could have been deposited at such sites. When organic and inorganic matter degrades and decomposes, gases are generated, typically including though not limited to ammonia, carbon dioxide, carbon disulfide, hydrogen chloride, hydrogen fluoride, hydrogen cyanide, hydrogen sulfide, methane, vinyl chloride, vinyl fluoride, and vinylidene chloride. These gases are flammable and extremely volatile. Some, such as hydrogen sulfide, are heavier than air and settle in low-lying places.

The primary routes of entry into the body are by inhalation and skin absorption. Symptoms of exposure include lightheadedness, giddiness, nausea, headache, numb extremities, dermatitis, loss of appetite, chemical pneumonia, and tremors. Exposure to elevated levels of these gases can damage the skin, eyes, and respiratory system, and can lead to death.

Metals

Metals commonly associated with batteries, paints, plating operations, and petroleum-based products include lead, arsenic, cadmium (a probable human carcinogen), chromium (a probable human carcinogen), copper, nickel, silver, tin, and zinc compounds. Petroleum-based products such as lubricants, especially leaded gasolines, contain organic lead compounds such as tetraethyl and tetramethyl lead, as well as assorted inorganic metals mentioned above and others such as antimony, barium, beryllium, cobalt, magnesium, manganese, and vanadium. Explosive powders used in ordnances also contain aluminum.

Metals pose a health hazard in their solid form, especially as airborne dusts. The primary routes of entry into the body are by inhalation, ingestion, and skin contact. Organic compounds such as tributyltin may penetrate the skin without producing appreciable local injury. Symptoms of exposure include eye, skin, and upper respiratory system irritation; headaches; insomnia; metallic taste in the mouth; lassitude; pallor; anorexia; constipation; abdominal pain; anemia; and tremors. Heavy metals can cause damage to the central nervous system, kidneys, respiratory system, and liver. Cancers of the lungs and bones are associated with metal intoxication.

Petroleum-Based Hydrocarbons

Lubricants, oils, fuels, and gasoline contain petroleum-based hydrocarbons such as benzene and its derivatives, naphthas, toluene, xylenes, and coal tar pitch volatiles. Coal tar pitch volatiles are also known as polycyclic hydrocarbons (PCHs) or polynuclear aromatics (PNAs). Benzene and PNAs are known carcinogens. Petroleum-based hydrocarbon materials also generally contain metal contaminants. (Refer to the metals

profile.) Lubricants and waste oils are slightly to highly volatile and flammable. Fuels and gasoline are extremely volatile and flammable.

The primary routes of entry into the body are by ingestion and skin contact or dermal absorption. Inhalation of the more volatile constituents, such as toluene, xylenes, naphthas, and benzene (a known human carcinogen) and its derivatives, can be toxic. Acute symptoms of exposure include eye, skin, and upper respiratory system irritation, giddiness, confusion, headache, nausea, staggered gait, and fatigue. High-level and chronic exposure can cause damage to the liver, kidneys, and bone marrow, and can cause skin cancer and leukemia.

Solvents (Halogenated)

Halogenated solvents are hydrocarbon compounds that also have halogen molecules such as chlorine, bromine, and fluorine. Generally, halogenated solvents are moderately to highly volatile and are non-combustible. Data are available mostly for chlorinated solvents, so this profile will be slanted toward chlorinated solvents; however, the information mentioned below pertains to halogenated compounds in general. The toxicity of halogens typically ranks as follows:

1. fluorinated;
2. brominated; and
3. chlorinated.

Some of the more common chlorinated solvent wastes include carbon tetrachloride*, chloroform*, methylene chloride*, methyl chloroform (1,1,1-trichloroethane), tetrachloroethene*, and trichlorethene (TCE). Substances followed by an asterisk are probable human carcinogens.

Primary routes of entry into the body are inhalation, dermal absorption, and ingestion. Symptoms of acute exposure include eye, skin, and upper respiratory irritation; flushed face and neck; vertigo; headache; lassitude; dizziness; fatigue; nausea; vomiting; disorientation; confusion; and poor equilibrium. High-level or chronic exposures can cause damage to the skin, eyes, liver, kidneys, central nervous system, respiratory system, and heart.

Solvents (Nonhalogenated) and Paints

Some of the more common constituents of nonhalogenated solvents and paint wastes include acetone, methyl ethyl ketone (MEK), toluene, xylenes, alkyl acetates, acrylates, and alcohols. These substances are slightly to highly volatile and are moderately to highly flammable.

Primary routes of entry into the body are by inhalation, ingestion, and dermal absorption. Symptoms of exposure include irritation of the eyes, skin, or upper respiratory system, headaches, drowsiness, dermatitis, dizziness, confusion, giddiness, and euphoria. Higher levels of exposure can cause narcosis and damage to the kidneys and blood.

APPENDIX D

Detailed Biological, Physical (Safety), and Radiological Hazards and Controls

APPENDIX D

BIOLOGICAL HAZARDS AND CONTROLS

Poisonous Insects and Animals

Ants, Bees, Wasps, and Hornets

Stings from these insects are responsible for more deaths in the United States than bites and stings of all other venomous creatures. This is due to the victim's sensitization to the venom from repeated stings, which can result in anaphylactic reactions. The stinger may remain in the skin and should be removed by teasing or scraping rather than pulling. An ice cube placed over the sting will reduce pain. An analgesic-corticosteroid lotion is often useful. People with known hypersensitivity to such stings should carry a kit containing an antihistamine and epinephrine.

Recently African "killer" bees have been found in Texas. Fatalities associated with these bees have resulted when the victim has sustained incapacitating injuries from a fall or slip and cannot escape the bees. The "killer" bees have the ability to sting repeatedly. Their venom is no more potent than that of the common honey bee. Observe the same first aid procedures as those stated in the previous paragraph.

Poisonous Snakes

Avoid walking at night or in grass and underbrush. Do not climb rocky ledges without first visually inspecting them. Wear high-top boots and heavy pants; more than half of all bites are on the lower parts of the legs. Do not attempt to kill snakes unnecessarily; many people are bitten in such an attempt.

A snake may bite a person and not inject venom. Symptoms and signs of envenomation include the presence of fang marks; rapid and progressive swelling around the bitten area within five to 10 minutes; pain; weakness; faintness; nausea; vomiting; and alterations in temperature, pulse, and blood pressure. Emergency treatment does not include incision through the fang marks. Typically, that causes more harm than good. Immobilize the person and the bitten part in a horizontal position, with the bitten part lower than the heart. Wash the bitten area with water but avoid manipulation of the bitten area. Do not allow the person to walk, run, or drink alcoholic beverages or stimulants such as soda, coffee, or tea. Do not apply ice or give aspirin. Treat for shock and transport to the nearest medical facility. Death in humans can occur within less than one hour to several days, with most deaths occurring between 18 and 32 hours after the bite.

Spiders

Almost all of the 30,000 species of spiders are venomous, but only a relatively small number have fangs long and strong enough to penetrate the human skin. Spiders are generally found in dark protected areas such as access ways to sanitary sewers, under ledges, or in pump housings and buildings.

Black widow spiders range in color from gray to brown to black, depending on the species. The abdomen is shiny black with a red hourglass or red spots. Although both male and female are venomous, only the latter has fangs large and strong enough to penetrate human skin. Mature females range in body length from 10 to 18 mm. The person who was bitten may recall receiving a sharp, pinprick-like bite, but in some cases the bite is so minor that it goes unnoticed. Rarely is there any local skin reaction. The initial pain is sometimes followed by a dull, occasionally numbing pain in the affected extremity, and by pain and cramps in one or several of the large body muscles. Sweating, weakness, and varying degrees of headache and dizziness are common. The lymph nodes in the region of the bite will often be tender or painful. In severe cases, there is rigidity of the abdominal muscles and pain in the lower back, thighs, or abdomen. There is no effective first-aid treatment. Treat for shock and transport to the nearest medical facility.

Brown Recluse or Violin Spiders have abdomens that vary in color from grayish through orange and reddish-brown to dark brown. The back shell of the "violin" is brown to blackish and distinct from the pale yellow to reddish-brown background of the head and chest. This spider has 6 eyes grouped in 3 diads. Both male and female are venomous. They average 6 to 12 millimeters in body length. The bite of this spider produces about the same degree of pain as the sting of an ant, but sometimes the person is completely unaware of the bite. In most cases, a localized burning sensation develops, which may last for 30 to 60 minutes. The area often itches and becomes red and warm with a small blanched area around the immediate bite site. The reddened area enlarges and becomes purplish during the subsequent one to 8 hours. A small blister forms at the bite site, increases in size, and subsequently ruptures. The entire area may become swollen and painful. Other signs and symptoms include fever, malaise, stomach cramps, nausea, and vomiting. In severe cases, there may be breakdown of the red blood cells, renal failure, or death. All first aid measures should be avoided as the natural appearance of the bite is most important in determining the diagnosis. A cube of ice may be placed on the wound. Transport to the nearest medical facility.

Ticks

Ticks can carry many diseases. Transmission of Lyme disease from ticks to persons has been studied. There is evidence that symptoms of the disease are not immediately apparent but begin after a period of time has passed. When in the field, check often for ticks. Ticks are best removed by applying gasoline or by slowly withdrawing the tick with flat-tip tweezers. Care should be taken not to leave any part of the tick in the wound and

not to crush the tick. If the tick resists or cannot be completely removed, seek medical attention. The bite should be cleansed and a corticosteroid lotion should be applied.

One of the symptoms of Lyme disease is a rash that looks like a "bull's-eye" with a small welt in the center. The rash visually develops several days to several weeks after the tick bite. Rocky Mountain Spotted Fever, which is also transmitted by ticks, also causes a rash of red spots under the skin three to 10 days after the bite. Both diseases cause chills, fever, headache, fatigue, stiff neck, and bone pain. Seek medical attention.

Poisonous Plants

Poison oak and poison sumac are bush-like plants. Poison oak and poison sumac are identified by three or five leaves radiating from a stem. The plant tissues have an oleoresin that is active in live, dead, and dried parts. The oleoresin may be carried by smoke, dust, contaminated clothing, and animal hair. Signs and symptoms include redness, swelling, and sometimes intense itching. Blisters form during the subsequent 24 hours. Crusting and scaling occur within a few days. In the absence of complications, healing is complete in approximately 10 days. Wash any exposed skin with a mild soap and water but do not scrub the area.

Rodents

Recently, a fatal respiratory illness has been associated with a Hantavirus. This respiratory illness has symptoms similar to the flu. Without medical intervention, the victim experiences respiratory and cardiac failure. This virus is shed in the droppings and urine of infected rodents, mice, and rats.

Any droppings (small rod-like, dry material), nesting activities, or dead animals are to be reported immediately to the SHSC or SM. A decision will be made as to the proper method of eliminating the infestation and cleaning up droppings.

PHYSICAL (SAFETY) HAZARDS AND CONTROLS

Possible physical hazards associated with field activities at the site may include any of the hazards discussed below. The controls specified shall be implemented during site operations. For additional information, refer to the Corporate Health and Safety Manual for Environmental Field Program and the Corporate Safety Manual.

Drilling Hazards and Controls

Core or well drilling for soil and water sampling involves a number of hazards including but not limited to the following: flying debris, machinery, hydraulic failures, unguarded points of operation, airborne particulates, equipment rollover, and other hazards associated with the transportation and use of drill rigs.

- The supplier of the drill rig shall ensure that equipment is well maintained, that it meets existing safety requirements, and that it is inspected on a regular basis and before each release to a new project.
- The rig shall be operated by a person fully qualified to operate the equipment, identify pending failures, and supervise the other operators and assistants.
- The rig shall be transported to the work site by a person with the proper commercial license.
- To the extent possible, the terrain should be level and the ground conditions adequate for secure placement of the rig so unexpected movement of the rig will be unlikely. Tugger and anchor lines shall be used to secure the rig if the slope is hazardous.
- Power transmission equipment, prime movers, and machine parts of rotary drilling equipment must be guarded. Chains and sprockets shall be enclosed to prevent accidental contact.
- Rig operators and assistants shall not wear any loose- or sloppy-fitting clothing that could get caught in any exposed moving machinery. Steel-toed footwear must be worn.
- Any visible or uncovered air or hydraulic lines that could become uncontrollable in the event of a failure shall be tied back or somehow secured.
- Emergency stop devices are required for the prime movers on drilling rigs to allow the operator or others to respond quickly to an emergency and prevent an accident or at least limit the injury. Emergency stops must be manually reset before restarting prime movers.

- A 20-pound A:B:C fire extinguisher (or equivalent) shall be readily available.

Excavation and Trenching Safety

An excavation is a man-made depression or cavity in the earth. A trench is a man-made excavation that is deeper than it is wide but is generally no wider than 15 feet. Excavations deeper than 4 feet are required to be shored, sloped, sheeted, braced, or otherwise supported. Before excavating, a permit must be obtained from the regional OSHA office and posted at the site.

Cave-ins develop very suddenly and without warning. Individuals can survive a maximum of 3 minutes without breathing, there is not much time to locate, dig out, and resuscitate a buried worker. Never get into an unprotected trench even if you believe it will be for only a few minutes. The action of your jumping into the trench may be enough to disturb the earth.

A number of basic guidelines must be followed for work near or in an excavation.

- Underground utilities must be located before any digging. Digging shall not occur where it is known that utilities are located unless the owners have been notified and the utilities have been shut down, isolated, or marked to prevent their accidental disruption.
- If the excavation is deeper than 20 feet, shoring plans must be designed and approved by a registered civil engineer.
- Inspect the area for hazards caused by moving ground.
- Silts, loams, or nonhomogeneous soils require shoring or bracing; they cannot be sloped.
- Before anyone enters the excavation, excavation must be inspected daily by a competent person.
- Inspect the excavation after every rainstorm, earthquake, or other hazard-increasing event.
- Locate spoil at least 3 feet from the edge of the excavation.
- Inspect the face, banks, and top of the excavation daily when workers are exposed to falling or rolling material.

- In trenches 4-feet deep or more, provide quick exit facilities (a ladder) every 25 feet or provide at least two exits for shorter trenches.
- Install crossings with standard guard rails and toeboards if overhead travel is necessary.
- Use additional bracing when vibration from vehicular traffic, heavy equipment, or external loads are a hazard.
- Erect barriers around excavations in remote work locations. Cover all wells, pits, shafts, and caissons. Backfill temporary wells, pits, and shafts when work is completed.
- Do not excavate beneath the level of adjacent foundations, retaining walls, or other structures until a qualified person has determined that the work will not be hazardous. Support undermined sidewalks and utilities.
- Shore, brace, or underpin structures when their stability is threatened. Inspect the structures daily.
- Shafts more than 4-feet square must be guarded by a lagging system made from proportionally larger materials as determined by a registered safety engineer.

Vapor explosions, especially in confined spaces, can be fatal. Workers must be aware of this danger and guard against carelessness at all times. Because the vapors of petroleum products and gases such as hydrogen sulfide are heavier than air, their explosivity and flammability hazard is increased. Vapors tend to concentrate near the ground, in low-lying areas, and are not readily mixed or diluted with ambient air. When monitoring the lower explosive limit (LEL), take measurements at ground level and as the excavation is entered.

To prevent explosion and fire hazards, each team member must make sure that no spark sources, such as lighters, matches, unapproved flashlights, etc., are brought into the exclusion zone. The SHSC or PHSM must inspect the exclusion zone for spark sources including wiring, motors, etc., and must enforce the requirements for fire prevention, including intrinsically safe electrical equipment, spark arresters on vehicles, and exclusion of unauthorized personnel. Continuous explosimeter/O₂ monitoring must be performed during drilling, digging, and excavation activities.

Fall Protection

- Employers shall provide employees with the necessary fall protection equipment and with instructions and training for its use.

- At the time of hire and during safety meetings, each employee shall be made aware of his/her obligation to use fall protection and associated equipment when the task dictates. This policy will be strictly adhered to, and any employee not using safety belts/harnesses and lanyards as required will be subject to immediate removal from the project. Policy statement to this effect shall be posted throughout the job site.
- Fall protection shall be used only for employees' safeguarding. When any of these are actually subject to in-service loading (as distinguished from static load testing), they shall be removed from service immediately and shall not be used again for employee safeguarding.
- Fall protection equipment and associated hardware shall be inspected after each use for wear and possible damage caused by use. Additionally, lifelines, safety belts/harnesses, and lanyards and associated hardware kept in storage shall be inspected periodically to ensure they have not been subject to damage, deterioration caused by storage conditions, or other factors that may reduce their strength. An inspection report shall be maintained on each fall protection equipment item to show the date inspected, the condition of the equipment, the serial number for each safety belt, the date the equipment was purchased, and the date the equipment was initially put into service.

Safety Belts/Harnesses and Lanyards

- Employees shall be secured by a safety belt/harness and lanyard if they are working at heights of 6 feet or more above a surface and are not protected by fixed scaffolding, guardrails, or safety nets.
- Special consideration should be given to the use of harnesses (in lieu of safety belts) in conditions where a fall is likely and where extraction of a fallen worker could not be immediate. Harnesses will provide better protection for the worker when a fall is arrested and will allow additional "hang time" without the increased chance of suffocation caused by waist belts.
- Body belts should not be used as the primary fall protection in high risk fall areas and must not be used without a shock absorber. Body (or waist) belts should only be used for positioning and where fall hazards are minimal. Body belts must never be used when immediate rescue is a problem.
- Safety belt/harness and lanyards shall be a minimum of 1/2-inch nylon or equivalent, with maximum length allowing a fall of no greater than 6 feet. The lanyard shall have a breaking strength of 5,400 pounds. All lanyards used with safety belts must be equipped with shock absorbers.
- All safety belts/harnesses and lanyard hardware shall be drop-forged or pressed steel, cadmium plated. Surfaces shall be smooth and free of sharp edges.

- All safety belt and lanyard hardware, except rivets, shall be capable of withstanding a tensile loading of 4,000 pounds without cracking, breaking, or becoming permanently deformed.

Lifelines

- Lifelines shall be secured above the point of operation to an anchorage or structure capable of supporting a minimum dead weight of 5,400 pounds.
- Lifelines used in areas where the lifeline may be subjected to cutting or abrasion shall be a minimum of 7/8-inch wire-core manila rope. For all other lifeline applications, a minimum of 3/4-inch manila or equivalent with a minimum breaking strength of 5,400 pounds shall be used.

Safety Nets

- The employer shall provide and require installation of safety nets to protect employees when workplaces are more than 25 feet above adjoining surfaces where use of scaffolding, catch platforms, temporary floors, safety belts, and/or lifelines is impractical. Safety nets shall be used to protect employees and/or the public exposed to hazards from overhead construction.
- Mesh size of safety nets shall not exceed 6 by 6 inches. Nets shall meet accepted performance standards of 17,500 foot-pounds minimum-impact resistance as determined and certified by the manufacturer and shall bear a label of proof test. Edge ropes shall withstand a minimum breaking strength of 5,000 pounds. Nets installed for overhead protection shall be lined with wire or synthetic netting of not more than 1 inch. Wire mesh shall not be less than 22 gauge, and synthetic mesh not less than No. 18 twine.
- Net suspension systems shall be designed and constructed with a minimum safety factor of four and shall withstand the test loading without permitting contact between the net and any surface or object below the net. Connections between panels shall develop the full strength of the net. Forged steel safety hooks or shackles shall be used to fasten the net to its supports.
- Safety nets shall be installed as close under the work surface as is practical, but not more than 25 feet below the working level. Nets shall extend at least 8 feet beyond the perimeter of the work area.
- Safety nets shall be field tested immediately following installation, repositioning, or major repair. The test shall be conducted by dropping a 400-pound bag of sand, not

more than 30 inches in diameter, from a height of at least 25 feet onto the center of the net.

- Nets shall be inspected daily for damage, and necessary replacements or repairs shall be made before work above the net is resumed. Debris shall be removed from the nets at least daily.

Heat and Cold Stress

Heat and cold stress can be a hazard encountered during field work. Heat stress is exacerbated when personal protective equipment is used. Physiological monitoring will be conducted as described whenever ambient temperatures or WBGT readings are greater than 86°F. If PPE is worn then monitoring will be initiated at 75° F (ambient or WBGT). Cold stress may require that field work be discontinued. Wind chill factors and ambient temperatures must be considered. Temperatures may be moderated by providing temporary shelters (enclosures) and portable heaters. Additional guidance is given in SOP 7.1 (EH&S Manual).

Workers Without Semipermeable Clothing

Workers who are not required to wear semipermeable clothing such as Tyvek suits should follow the Wet Bulb Globe Temperature (WBGT) guidelines outlined in the following table:

WORK-REST REGIMEN¹

Wet Bulb Globe Temperature in Which Various Work Loads Are Performed

| WORK-REST REGIMEN | LIGHT ² | MODERATE ³ | HEAVY ⁴ |
|---------------------------------|--------------------|-----------------------|--------------------|
| Continuous work permitted | 86° F (30.0° C) | 80° F (26.7° C) | 77° F (25.0° C) |
| 75% work 25% rest, each hour | 87° F (30.6° C) | 82° F (28.0° C) | 78° F (25.9° C) |
| 50% work 50% rest, each hour | 89° F (31.4° C) | 85° F (29.4° C) | 82° F (27.9° C) |
| 25% work 75% rest, each hour | 90° F (32.2° C) | 88° F (31.1° C) | 86° F (30.0° C) |

¹ Adapted from "Permissible Heat Exposure Threshold Limit Values" in *Threshold Limit Values and Biological Exposure Indices for 1993-1994*. American Conference of Governmental Industrial Hygienists. Cincinnati, Ohio. 1990. p. 83.

² Light work (up to 200 Kcal/hr or 800 British thermal units per hour [Btu/hr]): e.g., sitting or standing to control machines, performing light hand or arm work, etc.

³ Moderate work (200-300 Kcal/hr or 800-1,400 Btu/hr): e.g., walking about with moderate lifting and pushing, etc.

⁴ Heavy work (350-500 Kcal/hr or 1,400-2,000 Btu/hr): e.g., pick and shovel working, etc.

° C = degrees Celsius

° F = degrees Fahrenheit

Workers with Semipermeable Clothing

Workers who are required to wear semipermeable clothing should use physiological monitoring to determine the length of permitted work activities. The frequency of monitoring is based on the adjusted air temperature (ta adj.) as illustrated below. Calculate the ta adj. by using this equation: $ta\ adj\ ^\circ F = ta\ ^\circ F + (13 \times \text{percent sunshine})$. Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent of the time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows).

| ADJUSTED TEMPERATURE | NORMAL WORK ENSEMBLE | IMPERMEABLE ENSEMBLE |
|--------------------------------|--------------------------------|--------------------------------|
| 90° F (32.2° C) or above | After each 45 minutes of work | After each 15 minutes of work |
| 87.5°- 90° F (30.8°-32.2° C) | After each 60 minutes of work | After each 30 minutes of work |
| 82.5°- 87.5° F (28.1°-30.8° C) | After each 90 minutes of work | After each 60 minutes of work |
| 77.5°- 82.5° F (25.3°-28.1° C) | After each 120 minutes of work | After each 90 minutes of work |
| 72.5°- 77.5° F (22.5°-25.3° C) | After each 150 minutes of work | After each 120 minutes of work |

Source: NIOSH/OSHA/USCG/EPA, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*. October 1985. p. 8-22.

The actual length of the work-rest cycle is based on the results of physiological monitoring, which includes pulse and body temperature. Body temperature can be taken with an oral or tympanic (ear) thermometer. The tympanic thermometer is recommended because the instrument gives an accurate result in less than one second.

Pulse Rate Criteria

Take resting radial (wrist) pulse at start of work day; record it. Measure radial pulse rate for 30 seconds as each rest period begins. The pulse rate should not exceed 110 beats per minute (bpm), or 20 bpm higher than the resting pulse rate. If the pulse rate exceeds this criterion, reduce the work load and/or shorten the work cycle by one third, and observe for signs of heat stress. No team member shall return to work until his/her pulse rate has returned to less than 110 bpm, or 20 bpm above resting pulse.

Oral Temperature

Use a tympanic thermometer (one second in the ear) or clinical thermometer (three minutes under the tongue) or similar device to measure the body temperature at the end of the work period (before drinking). The action required depends on the worker's temperature:

- If body temperature exceeds 99.6° F (37.6° C), shorten the next work cycle by one third without changing the rest period.
- If body temperature still exceeds 99.6° F (37.6° C) at the beginning of the next rest period, shorten the following work cycle by one third.
- Do not permit a worker to wear a semipermeable garment when his/her body temperature exceeds 100.6° F (38.1° C).

Physiological monitoring shall be documented using the form provided in Appendix I.

Symptoms and Treatment of Heat and Cold Stress

Table D-1 presents symptoms and treatment of heat and cold stress.

Noise

The main sources of noise for this project are industrial operations, vehicles, concrete cutters, drill rigs, generators. Hearing protection must be worn in areas where noise levels are at the permissible exposure limit (PEL) of 85 dBA or greater. Hearing protection is required when, at 3 feet apart in normal conversation, voices must be raised to be heard. A Type II sound level meter should be used to measure site noise to verify sound levels and determine the need for hearing protection. Hearing protection should be specified by the PHSM or SHSC based on measured levels at the site.

Precariously Positioned Objects

Field personnel shall become familiar with the general area and the potential physical hazards associated with debris or objects (e.g., drums, boards) that may be piled or scattered around the sites. If objects are stacked in an unsafe manner, the PHSM shall notify the client site contact. Field activities shall not begin until station personnel remove or safely restack the objects.

Utility Lines

Utility lines both aboveground and belowground may pose a hazard to team members during field activities. Personnel must maintain a safe clearance (at least 15 feet) from overhead utility lines at all times. The locations of utility lines must be determined before excavating, digging, or drilling. No drilling is to take place without locating and identifying underground utility lines. Jacobs SOP 7.7 (EH&S Manual) shall be strictly followed.

Walking and Working in Open Terrain

Field personnel shall become familiar with the general terrain of the site and potential physical hazards (evaporation ponds, uneven terrain, etc.) that would be associated with accidental slips, trips, and/or falls.

TABLE D-1

Symptoms and Treatment of Heat and Cold Stress

| Condition | Symptoms | Treatment |
|-----------------|---|--|
| Heat Stroke | Red, hot dry skin; no perspiration; dizziness; confusion; rapid breathing and pulse; high body temperature. | This is a MEDICAL EMERGENCY! Cool victim rapidly by soaking in cool (not cold) water. Loosen restrictive clothing. Get medical attention immediately! |
| Heat Exhaustion | Pale, clammy, moist skin; shallow breathing; profuse sweating; weakness; normal temperature; headache; dizziness; vomiting. | Move victim to a cool, air-conditioned area. Loosen clothing; place head in low position. Have victim drink cool (not cold) water. |
| Frostbite | Blanched, white, waxy skin, but tissue resilient; tissue cold and pale. | Move victim to a warm area. Warm affected area quickly in warm (not hot) water. Have victim drink warm fluids not coffee or alcohol. Do not break any blisters. Elevate the injured area and get medical attention. |
| Hypothermia | Shivering, apathy, sleepiness; rapid drop in body temperature; glassy stare; slow pulse; slow respiration. | Move victim to a warm area. Have victim drink warm fluids not coffee or alcohol. Get medical attention. |

- The period immediately after medium and heavy rainfall is particularly susceptible to earth movement and slides, so be attentive to the area immediately in front of you. It is possible that wells, pits, holes, or similar hazards may be partially covered or visually obstructed.
- Be cautious around soil or terrain that may have been recently disturbed, relocated, or otherwise made less stable.
- Avoid the top edges of drop-off areas, whether they have been disturbed or not.
- Travel on open terrain in the company of another person.

Confined Space Entry Procedures

- Jacobs SOP 8.6 (Corporate Safety Manual) shall be followed.
- Before personnel enter a confined space, a confined space/vessel entry permit must be properly filled out, dated, posted, and signed. This permit is valid only for one shift for the specified work location and time period indicated on the permit.
- Air will be monitored continuously with an oxygen meter, explosimeter, and hydrogen sulfide and/or carbon monoxide meter during entry. Prior to entering the confined space, lower the measuring probe or the meter into the space to monitor the concentrations from top to bottom of the confined space. If the meter readout cannot be seen from the top of the confined space, the instrument should be capable of sounding an alarm at concentration(s) considered hazardous.
- At least three people are required during confined space entry:
 - the person entering the confined space;
 - a stand-by attendant who is observing the person in the confined space at all times;
 - a person the attendant can notify if an emergency occurs. This person must be close enough to hear the attendant calling for assistance.
- The confined space may require venting by blowing air into the space. The PHSM or SHSC shall make this determination.
- Personnel entering the confined space may be required to wear a lifeline and safety harness (five-point-attached at the back). The lifeline shall be attached to a tripod or similar method for removal of personnel in case of an emergency.

- Conditions may require additional lighting.
- Any necessary electrical connections shall be in proper working order and be properly grounded.
- All piping and electrical systems associated with a confined space (e.g., tank or vessel) shall be physically blanked or locked out of service.

Tagging of Defective Tools, Materials, or Equipment

Defective tools, materials, and equipment that could impact personnel safety or the environment shall not be used. When a defective tool, material, or piece of equipment is found, the contractor shall take it out of service immediately by tagging, destroying, or removing it from the project. Danger tags shall be dated, sequentially numbered, and signed by the supervisor. A defective equipment log shall be maintained.

Housekeeping

The contractor will strictly enforce housekeeping. Poor housekeeping is a sign of a poorly managed project and is the root of many safety problems. All material, scrap, tools and toolboxes, and other equipment shall be stored in a neat and orderly fashion. Trash and scrap shall be removed from the work area on a regular basis (i.e., at least daily before the end of each work shift) and shall never be allowed to accumulate, especially in walkways, under stairs, at the bases and landings of stairs and ladders, and near flammable substances.

Housekeeping will receive a major emphasis during daily and weekly contractor inspections. If the contractor determines that housekeeping has become a problem, the contractor reserves the right to stop work and require a cleanup before work resumes.

Illumination

Adequate lighting is extremely important for the safe execution of work. The minimum illumination intensity shall be 5 foot-candles in all active work areas and accessways. In specified areas outlined in the OSHA standard, 29 CFR 1926.56, the required intensity ranges as high as 20 foot-candles. Lighting intensity will be surveyed during the regular contractor job site inspections.

Slip, Trip, and Fall Hazards

Falls as a result of slipping or tripping are the most common form of injury on construction sites. These injuries are a result of poor housekeeping, lack of attention to detail, or carelessness.

Slipping hazards such as grease, oil, water, ice, snow, or other liquids shall be cleaned up or eliminated on walkways, ladders, scaffolds, or other accessways or working areas. If slipping hazards cannot be eliminated completely, the area shall be barricaded and posted with applicable hazard postings.

The construction site, especially roadways, accessways, aisles, stairways, scaffolds, and ladders, shall be kept clean and clear of hoses, extension cords, welding leads, and other obstructions that may cause tripping or other accident hazards. If tripping hazards cannot be eliminated completely, the area shall be barricaded and posted with applicable hazard postings.

Fire Protection and Prevention

The subcontractor shall take all necessary and appropriate precautions to prevent fires. Sufficient water and fire fighting equipment shall be available at all times to control fires as specified below. All heavy equipment must be equipped with 5-pound dry chemical fire extinguishers rated A:B:C. A 10-pound dry chemical fire extinguisher rated A:B:C must be located in all trailers per The National Fire Protection Association (NFPA) 10 Standard. A 20-pound fire extinguisher rated A:B:C must be provided within 50 feet, but no closer than 25 feet, to all fueling operations and flammable storage areas.

All fire extinguishers shall be mounted on walls or stands with a red background. Fire extinguishers shall not be mounted with the top less than 3 feet or greater than 5 feet above the floor. Access routes to fire extinguishers shall be kept clear at all times. All fire extinguishers shall be inspected monthly, annually, and every 6 years in accordance with the NFPA 10 Standard on fire extinguisher inspections.

Open burning of trash and debris shall not be permitted. If there is a danger of accidental fire, e.g., during cutting or welding operations, a person shall be designated as fire watch and shall be dedicated solely to this effort during that operation and shall continue this duty for 30 minutes after the operation is completed.

Internal combustion engines will not be permitted to operate in buildings unless authorized by the contractor. Engines shall be turned off while refueling. Storage of flammable fuels will be carefully monitored. All fuel storage areas and storage tanks must have written approval by the contractor. Marking and labeling of fuel tanks shall meet the requirements of OSHA 29 CFR 1926.59. All heating devices and their locations must be inspected by the Contractor Safety Department before use. Fueling areas and tanks shall comply with all applicable NFPA and OSHA requirements.

Flammable or combustible liquid storage shall comply with NFPA 30 and OSHA 1926.152. All fuel cans, such as 5-gallon gas cans, shall be free of deformities and constructed of metal, with self-closing lids and flame arresters. Fuel cans shall be labeled with their contents. All equipment shall be fueled through funnels or spouts to prevent spills.

Material Handling and Storage

All new material shall be stored on dunnage. All material shall be stored and secured as necessary to prevent blowing, falling, sliding, or collapsing. Debris and scrap material need not be stored on dunnage if the material will not be moved with rigging and can be maintained in a stable manner. Jacobs and all subcontractors shall ensure that material is stored properly to prevent scattering or lost equipment.

Walkways and aisles shall be kept clear at all times, and laydown areas shall be neat and orderly. Material shall be stored on level ground, and the boundaries of laydown areas shall be identified. Material shall not be stored within 6 feet of hoistways or floor openings, or within 10 feet of roof edges. Poles, pipe, and other stock that may roll shall be wedged to prevent spreading and rolling.

Nails shall be removed from lumber that is to be reused. Nails in scrap lumber that will not be rehandled shall be bent back.

No material, tools, or equipment shall be leaned against other objects or walls unless they are secured from movement. Employees moving material by hand shall use proper lifting techniques and gloves. Safe working load limits shall be labeled on all temporary elevated floors or platforms and these limits shall not be exceeded.

Tools

All tools shall be kept in good condition and properly stored. Tools shall not be altered, and they shall be used only for their intended purposes. Guards shall not be removed from tools, and all nip points, open drums, and fly wheels shall be guarded. All tools shall be inspected by the user before use, with special attention to power cords and the condition of teeth. If a power cord has been repaired more than once, the tool shall be tagged defective, and not used until a new power cord is installed. Drawings of job-built jigs and tools shall be submitted to the contractor. Owners' manuals shall be available to the contractor upon request, and subcontractor personnel shall be trained in the safe operation of all tools used.

Power tools shall be equipped with constant pressure switches that will shut the tool off when the switch is released. All power tools and electrical equipment shall be double insulated or be equipped with ground plugs.

Employees using powder-actuated tools shall be certified and have on their person a card stating such. The loads for powder-actuated tools shall be kept in a locked red box labeled "EXPLOSIVES", which shall be kept in a locked area with restricted access.

All bench-mounted and floor-mounted tools shall be secured. Bench-mounted grinders shall be set up and operated according to 29 CFR 1926.303. Tools equipped with handles shall have the handles installed. Cracked, splintered, or taped wooden handles shall be replaced. Cheater bars will not be permitted. Impact tools shall be free of mushroomed heads and cracks. Workbenches and sawhorses shall be provided when needed.

Torch/Plasma Arc Cutting, Welding, and Open Flame Requirements

The SM shall identify the need to conduct cutting, burning, or open flame work. When the need has been identified, the contractor supervisor shall complete Cutting/Welding/Open Flame Permit. The permit is then submitted to the SM for review.

At a minimum, fire prevention equipment shall consist of one 10-pound, dry chemical extinguisher rated A:B:C. A live water line meeting the requirements of OSHA 29 CFR 1926.150 or a water pump extinguisher may be used as a supplement to the dry chemical extinguisher. The work area shall be barricaded and posted; the equipment shall be inspected and exits identified.

The approved permit shall be posted in the work area. Adjoining work areas shall be inspected and workers in the immediate vicinity shall be notified.

Upon completion of the above requirements and the precautionary items addressed in the permit, work may commence. The permit may be issued for more than 1 day; however, a daily safety checklist shall be completed by the subcontractor supervisor.

Upon completion of work activities, the permit and checklist shall be returned to the contractor construction engineer.

Torch/plasma arc cutting or welding on galvanized steel, stainless steel, or nonferrous metals shall not be permitted unless half-face or full-face air purifying respirators with high-efficiency particulate air (HEPA) cartridges or equivalent engineering controls (local exhaust with HEPA filtration) are provided. Full-face respirators with HEPA cartridges shall be required during torch cutting on radiologically contaminated metals and metal with lead or cadmium-bearing coatings.

Torch/plasma arc cutting shall not be used on wood, synthetic materials, rubber-lined pipe and vessels, or on any process piping, tanks, vessels or equipment containing significant radioactive material product residues unless approved by the contractor.

Any torch/plasma arc-cutting operation that may expose workers to contaminants in excess of the action level, without regard to the use of respirators, shall be controlled with the use of local exhaust ventilation in conjunction with a high-efficiency particulate collection system. If gaseous or vapor exposure limits are exceeded, respirators with appropriate cartridges shall be used.

Compressed gas cylinders shall be secured in an upright position at all times. Burning rigs shall be broken down at the end of each shift. Fuel gas hoses shall be stored in a ventilated area (never in gang boxes). Compressed fuel gas cylinders shall not be taken into confined spaces. All other rigs shall be stored in accordance with OSHA standards. Empty cylinders shall be removed at the end of each shift. Burning rigs shall be equipped with backflow preventers at the torch end of each hose.

If there is the potential for accidental fire during burning or welding operations, a fire watch shall be established and continued until 30 minutes after the work has been completed. When there is possibility of injury during burning or welding operations, overhead burning signs and welding blinds shall be installed. A 10-pound dry chemical fire extinguisher rated A:B:C must be readily available to any welder or employee operating a burning or welding rig.

Welding leads, including lugs on the welder and lead connections, shall be fully insulated at all times. Damaged leads and dry-rotted fuel hoses shall be removed from service.

The subcontractor shall notify the contractor if any welding or burning is to be done from a suspended platform. The subcontractor will be required to comply with contractor requirements during such operations. Requirements may include the use of multiple fire watches, covering flammable/combustible materials below the work platform, or other safety measures.

Lockout/Tagout/Try of Energy Sources

The subcontractor will be required to follow the lockout/tagout/try procedures described in this section during all operations where stored energy such as mechanical energy, electricity, steam, or material in pipelines may be present.

Lockout procedures provide a method for equipment status control to protect personnel from injury or exposure to hazardous materials, protect equipment from damage, prevent unauthorized environmental discharge, and maintain the operability of station systems. The procedure verifies that equipment and/or facilities are de-energized, inoperable, and

safe to repair, alter, clean, inspect, or disassemble, and that no injury or property damage occurs as a result of inadvertent operation.

Definitions

| | |
|--------------------------------|---|
| Affected Employee | An employee who performs his or her duties <u>in an area</u> where the energy control, lockout/tagout procedure is implemented. An affected employee <u>does not perform</u> servicing or maintenance on the locked out equipment, but may operate the equipment during routine operations. The affected employee <u>is not</u> responsible for implementing this procedure. |
| Authorized Employee | A subcontractor or contractor employee who services and/or maintains locked out machines and equipment or who locks out machines/equipment for administrative reasons. The authorized employee initiates and implements the lockout/tagout activities. |
| Competent Person | A subcontractor or contractor employee who is capable, by training and experience, of identifying existing and predictable hazards in the surroundings or working conditions and is authorized to take prompt, corrective measures to eliminate them. |
| Energy Source | Any source that generates, or conduit that carries, electrical or potential energy; hydraulic, pneumatic, hazardous liquid or gases, or steam pressure; vacuum; high temperature; cryogenic temperature; stored mechanical or electrical energy, or any other hazardous source that could cause harm to personnel, equipment, or the environment. |
| Energy-Isolating Device | A mechanical device that prevents energization of equipment or the transmission or release of energy. This includes, but is not limited to, a manually operated electrical circuit breaker; disconnect with a manually operated switch, slip blind, blind flange, block valve; or a similar device with visible indication of integrity of the energy-isolating barrier. (Push buttons, selector switches, control devices, and check valves are not energy-isolating devices.) |

Incident Report

A written account concerning operational, safety, or environmental practices that are not in accordance with Jacobs' procedures.

Lockout/Tagout

The placement of a single lockout device and lockout tag on the energy-isolating device of a piece of equipment in accordance with an established procedure, so that the energy-isolating device and the equipment controlled cannot be operated until the lockout device is removed.

Lockout Device

A device used with a positive means, such as a lock, to hold an energy-isolating device in the safe position, thereby preventing the energizing of equipment and the transmission or release of energy. When used with a lock, hasps, chains, valve handle covers, and other devices may be treated as lockout devices. The lockout device shall be standardized for the application and able to withstand the environment to which it will be exposed, considering time, weather conditions, and chemical environment. It shall be substantial enough to prevent removal without excessive force or unusual techniques such as the use of bolt cutters or metal cutting tools. The locks used for and during a lockout shall be uniquely numbered and keyed with a five-tumbler design and have the authorized employee's lockout tag affixed.

NOTE: Locks that are keyed alike shall not be used for lockout/tagout. Lockout/tagout locks shall not be used for any other purpose.

Lockout Tag

The tag shall be standardized (i.e., color, shape, size, and lettering format), made of a material that will withstand all environmental conditions, and shall be substantial enough to prevent inadvertent or accidental removal. The tag shall be printed with the words "Danger, Do Not Operate," and shall be attached to the lockout device with a nylon cable tie that is self-locking, not reusable, and has a minimum unlocking strength of 50 pounds. The tag shall indicate:

- Authorized employee's printed name and signature
- Date of lockout
- Subcontractor performing the lockout
- Brief but complete description of the energy source or sources being locked out (i.e., lockout electrical disconnect for Pump 1).

Lockout/Tagout/Try Permit

The form that must be completed by the authorized employee and signed by a lockout supervisor and construction engineer prior to obtaining lockout devices and lockout tags.

Multiple Lockout/Tagout

The placement of lockout devices and lockout tags on an energy-isolating device or piece of equipment by two or more controlling parties (i.e., the authorized employee and the competent person), so that the energy-isolating device and the equipment controlled cannot be operated until all lockout devices and tags have been removed.

No Fault Lockout Removal Form

A form that must be completed by anyone requesting removal of a Lockout/Tagout when the authorized Lockout/Tagout employee is offsite due to illness, injury, or personal emergency. The requestor must obtain written contractor management approval of the requested No Fault lockout removal form.

Try

The physical verification that all breakers, valves, or other devices are correctly locked and tagged and that all energy sources have been isolated after a lockout device has been applied. Verification is trying to operate the system to ensure that the intended components are de-energized and isolated. The "try" test shall include an attempt to activate the system with lock-out devices in place, if possible.

Responsibilities

The authorized employee shall be responsible for:

- Identifying energy-isolating devices requiring lockout/tagout
- Initiating the Lockout/Tagout Permit
- Filling out the required information on the lockout tag
- Applying the first lockout device and tag to all energy-isolating devices requiring lockout/tagout
- Witnessing a "try"
- Upon completion of work, removing the applied lockout device and tag from all energy-isolating devices that were locked out, only after all other lockout devices and

tags have been removed and after verifying that the system is repaired and safe to energize.

The competent person shall be responsible for:

- Verifying that the energy-isolating devices requiring lockout/tagout have been identified during a multiple lockout/tagout.
- Applying the lockout device and tag to all energy-isolating devices during a multiple lockout/tagout.
- Performing a "try."
- Upon completion of work, removing the lockout device and tag from all energy-isolating devices that were locked out during a multiple lockout/tagout, only after verifying the system is ready to energize.

The construction engineer (CE) shall be responsible for:

- Coordination between the contractor and subcontractors to verify a safe lockout/tagout.
- Review of the Lockout/Tagout Permit, relevant Task-Specific Safety Assessments (TaSSAs) or Safe Work Plans, maintenance work orders, testing plans, and/or procedures before allowing a lockout/tagout to proceed.

All subcontractor personnel that will perform lockout/tagouts shall attend the contractor's training, which is available upon request. The training is approximately 4 hours in duration.

Preparation for Shutdown

The authorized employee shall determine all necessary lockout points and complete the Lockout/Tagout/Try Permit prior to being issued lockout devices and tags by the contractor.

The construction engineer will review the permit, TaSSA, or Safe Work Plan, and test plans or procedures before lockout conditions are permitted.

The authorized employee shall keep a copy of the original permit at all times during the lockout period. The original permit will be retained by the contractor.

The authorized employee shall complete the lockout tags and sign for the lockout devices in the contractor's Lockout/Tagout Log Book.

The lockout device shall be under the exclusive control of the authorized employee or employees performing the work.

The authorized employee shall notify all affected employees of an energy lockout prior to applying the lockout.

Applying and "Trying" Lockout/Tagout Device

Prior to applying a lockout/tagout, the machine or equipment shall be shut down using normal operating procedures.

If lockout/tagout is required to perform maintenance on a piece of equipment that is in a pipeline containing hazardous or nonhazardous materials, the pipeline and equipment shall be valved off; the lockout devices and tags applied; and the pipeline drained prior to beginning work. Equivalent isolation procedures such as the use of blind flanges or double block and bleed systems may be used, subject to contractor approval.

The authorized employee shall:

- De-energize the appropriate energy sources
- Place individual lockout devices and lockout tags at all energy sources that could possibly energize the system
- Verify the lockout by "trying" the system.

If more than one subcontractor is involved in a lockout, the authorized employees of other subcontractors shall attach their locks and tags to the energy-isolating and/or lockout device.

When maintenance and/or construction is required on an existing electrical distribution system for the water treatment plants or other facilities or equipment, the authorized employee shall receive technical assistance from the site electrical subcontractor prior to installing or removing a lockout. The site electrical subcontractor shall be considered a "competent person" to determine and advise the status and the effect of the lockout on interconnected systems. Prior to performing "hands on" testing or work relative to an electrical distribution system lockout, the site electrical subcontractor shall prepare a TaSSA.

When electrical work is actively under construction, repair, or maintenance by an electrical subcontractor, the electrical Subcontractor performing the work shall be considered the "authorized employee" and the "competent person".

Removal of Lockout Devices and Tags

Before energy is reinstated, the authorized employee shall:

- Immediately notify all affected employees before removing locks and tags and energizing equipment
- Inspect the area to verify that nonessential items (tools, etc.) have been removed
- Inspect the equipment to verify that all components (machine guards, safety devices, etc.) are in place and capable of operating properly
- Check the area to verify that all affected employees are safely positioned or out of the area
- Remove lockout devices and tags from each energy-isolating device.

NOTE: Lockout devices and tags shall be removed ONLY by the person who applied them, except as noted herein.

- Replace equipment/system tags or labels that were removed or disturbed during the lockout
- Return all lockout devices and tags along with the copy of the Lockout Permit to the contractor
- Notify all affected employees that the energy lockout has been terminated.

When the above steps have been completed, the authorized employee shall energize the appropriate energy sources.

Multiple Lockout/Tagout

A multiple lockout/tagout shall be used when:

- Hazardous materials could be introduced into the system accidentally. This determination will be made on a case-by-case basis by a competent person.
- A complicated situation exists where more than one energy source is to be locked out (e.g., a piping system including pumps, valves, pneumatic and electrical instrumentation, all of which require separate lockout devices and/or energy-isolating devices).
- When directed by the contractor.

When a multiple lockout/tagout is required, a lock and tag shall be placed on the energy-isolating device by a competent person who shall:

- Obtain lock and lockout tag after completing a lockout/tagout permit
- Verify independently, by a hands-on physical check, that the authorized employee has placed lockout devices and tags at all points that could possibly energize the system
- Place individual lockout devices and lockout tags at the points that have been verified for the lockout
- Verify the lockout by "trying" the system
- Remove lockout devices and tags in accordance with the procedure above, but only after verifying that maintenance/repair is complete and the system is safe to energize.

Tagout Only

If a lockout device cannot be installed on an energy or potential hazard source, a lockout tag shall be used and considered a valid lockout. The lockout tag shall be countersigned by the contractor who may require additional safeguards as deemed necessary on a case-by-case basis.

Testing During Lockout

When a system must be tested during a lockout, the authorized employee shall:

- Notify the contractor who will then issue a testing tag
- Make an entry on the log/permit
- Complete the information required on the testing tag
- Remove the original lockout tag and replace with the testing tag
- Notify affected employees that the system will be energized for testing
- Remove the lockout devices
- Energize and proceed with testing
- De-energize all systems after testing
- Reapply lockout/tagout devices as required using the original lockout tag or by acquiring another lockout tag from the contractor.

Unauthorized Removal of Lockout/Tagout Device

An employee who removes another employee's lockout/tagout device (except as authorized below) shall be subject to disciplinary action in accordance with Section 1 of this HSP. Disciplinary action may include dismissal.

In the case of a single or multiple lockout, if the authorized employee or competent person is not available to remove the lockout/tagout device, the subcontractor must obtain written contractor management authorization for removal. A no-fault removal form shall be used whenever the authorized employee is unavailable to remove the lockout. This section only applies if the authorized employee is either:

- Offsite due to an illness/injury
- Offsite due to a personal emergency.

This section does not apply in the following instances:

- The employee is terminated
-
- The employee knew he/she would be offsite and was aware of the need to remove the lockout.

All sections of the no-fault removal form must be completed prior to removing the lockout.

If a key is lost or misplaced, the above requirements shall apply. The lock will be destroyed so that it cannot be used in future lockouts.

If a lockout device is found unlocked and unattended, any employee shall immediately report the finding to the contractor.

Lockout/Tagout During Shift Change

Affected employees shall be advised of all lockouts at shift turnover.

During shift or personnel changes, the following shall apply to verify continuity of lockout or tagout protection when continued maintenance, repair, or testing will be performed on equipment.

The offgoing authorized employee and the oncoming employee who will replace the authorized employee must meet and confer on the operation. This meeting shall include, but not be limited to:

- The full scope of the work being performed
- A walk-through of the equipment or system being worked on and status of work progress
- The location of all lockout and tagout devices under the authorized employee's control.

After this orientation, the offgoing authorized employee shall turn over the lockout device key or keys to the oncoming employee who shall then be the authorized employee.

Both employees shall fill out the permit with name, time, and date, indicating that the original authorized employee is turning over custody and control of lockout devices to the new oncoming authorized employee.

A new lockout tag shall be attached to the lockout device by the oncoming authorized employee and the old tag returned to the contractor.

If a multiple lockout will be removed during a back shift, (i.e., a work shift other than day shift), the competent person and/or authorized employee or employees shall designate alternates and the above procedure is to be followed.

If two noncontiguous shifts occur, the authorized employee shall turn over his key to the onshift CE, who shall assume key responsibility.

If multiple keys will be turned over during a shift change, a shift lockout box may be used. After all keys are placed in the box, a lock and tag shall be placed on the box hasp by the onshift CE after completing a Lockout/Tagout Permit, and the box shall be controlled by the onshift CE. When using a shift lockout box, the onshift CE shall become the authorized employee without changing each individual tag in the field. The single lockout box tag shall govern.

Periodic Inspection

Lockout/tagout holders shall inspect the energy isolation devices once per shift to verify that the locks and tags are in good order.

Shift/crew supervisors shall inspect energy isolation devices once per day to verify that the procedure is being followed and shall interview personnel working under the lockout to confirm their familiarity with the procedure and the related responsibilities. This inspection shall be documented in the subcontractor's daily log.

Electrical

Work on energized circuits will not be permitted at the site.

Ground fault circuit interrupters (GFCIs) will be required at all times. Lighting must be hooked up to a GFCI unless the electrical connections are different from all other electrical hookups and cannot be mistakenly exchanged.

Electrical panels, boxes, etc., with open knockouts through which no service has been installed must be covered. Electrical cords and equipment shall not be hung or tied to steel or hung with wire unless a nonconductive material is used to insulate the cord from the metal. Plastic coated wire shall not be used to hang electrical cords. All lights must be equipped with protective, nonconductive covers, and all light bulbs in light stringers must be shatterproof. Cords that pass through doorways or holes or are exposed to vehicle traffic shall be protected from damage. Flexible electrical cords shall not be spliced or have insulation repaired with tape. Only SO-type cords or equivalent shall be used for light stringers.

All breaker boxes, electrical receptacles, and feed lines shall be labeled to identify the "from" and "to" circuits. All breaker boxes and disconnects shall be provided with unobstructed access 36 inches in front of the unit. All 480-volt lines shall be labeled clearly. When passing over or through walkways, electrical cords shall be strung at least 7 feet above the walking surface. The subcontractor shall comply with codes in the current NFPA and National Electric Codes (NEC).

Ladders

All ladders shall be inspected before use and stored on dunnage or ladder racks. Tools and material shall not be left on top platforms of unattended ladders, and material shall never be stored on ladders. All ladders shall be labeled with legible manufacturer instructions and warning labels. Ladders shall not be painted except for identification marks.

All ladders shall be type 1A and shall be wooden or have fiberglass siderails with metal rungs. The bases and landings of all ladders shall be kept clear of obstacles. Stepladders shall not be used as straight ladders, and extension ladders shall not be separated for use. All ladders shall be equipped with skid-resistant feet. If a ladder is used in a doorway, the doorway must be barricaded. Ladders shall not be used in lieu of elevated work platforms.

Employees shall never carry material when climbing ladders, nor shall tools or equipment be thrown to or from personnel on ladders. Handlines shall always be used to hoist material. Personnel shall not climb to the top step or top platform of any ladder. When in use, ladders shall be held or secured by tying off. Personnel working on ladders shall not straddle the ladder or overreach so that the body is no longer between the siderails.

Job-built ladders shall be inspected by a competent person and shall meet the OSHA standard. In addition, all job-built ladders shall have a furring strip attached over the filler block and rung.

Scaffolding

Scaffolding shall be erected and used according to the most stringent interpretation of the applicable safety regulations. Only heavy-duty (75 pounds per square foot [psf]) scaffolds will be permitted. All scaffolding shall be erected and inspected by a competent person. Samples of the Stationary Scaffolding Inspection Checklist and Rolling Tower Inspection Checklist are provided. All scaffolding shall be built as completely as possible. This means all decks must be complete (e.g., if a handrail can be installed, it must be installed, and the scaffold must have ladder access and gates).

If a chain or slide bar is used as a gate, a landing between the ladder and the gate shall be erected so that personnel can leave the ladder safely before unchaining the gate or moving the slide bar. All scaffolds shall be equipped with handrails (if possible), regardless of the height of the scaffold. If personnel are required to work under or pass under a scaffold, the area between the guardrail and toeboard shall be screened with No. 18 gauge 0.5-inch mesh wire or equivalent.

Aluminum scaffold boards shall be used whenever possible. Scaffold boards shall not be notched, nailed, used as bearers, or used on the ground as walkways. All scaffold boards shall be cleated and tied with No. 9 gauge wire to prevent displacement. Scaffold boards shall be placed together tightly with a maximum space of 0.25 inch between the planking and toeboard. Crawling boards and chicken ladders are prohibited.

The subcontractor shall submit to the contractor a tagging and inspection system for scaffolds and other elevated work platforms. This system shall include the method of determining if scaffolding is under construction or unsafe, requires a safety harness, or is approved for use. It shall also include the date on which the scaffolding was last inspected and the name of the inspector. The subcontractor may elect to use the contractor's procedure, *Scaffold Inspection Tagging*, by indicating this intention in writing to the contractor. A copy of the procedure will then be provided by the contractor. All scaffolds shall be equipped with legs and base plates and shall be placed on mud sills.

Parts from scaffolds made by different manufacturers shall not be interchanged. Welded frame scaffolding shall not be repaired or altered. **Anti-sway bars shall be installed on all rolling scaffolds;** only welded frame scaffolds may be used as rolling scaffolds. Personnel shall not ride on rolling scaffolds.

All scaffolds must be plumb and tied off every 15 feet or three times the minimum base dimension, whichever is the most conservative. Scaffolding without handrails shall be

placed no more than 4 inches from a wall. Drawings of all two-point suspended scaffolds and needle beam scaffolds shall be submitted to the contractor before such scaffolding is erected.

All scaffolding higher than 50 feet, as measured from the base plate, shall be designed by a registered professional engineer. Such designs shall be submitted to the contractor for review and approval.

Power-Driven Staging and Platforms

All equipment discussed in this section must be inspected by the contractor before initial use and by the subcontractor prior to every use. In addition, a documented inspection by a competent person must be conducted quarterly.

All operators of power-driven staging and platforms shall be trained in their use, and the training records shall be submitted to the contractor. Owners' manuals and drawings of connection methods for all such equipment shall also be submitted to the contractor. A copy of the owner's manual shall also be kept on each platform. All power-driven staging and platforms shall be placarded properly, and controls shall be labeled clearly.

Operators shall use a check sheet during pre-operational inspections and shall verify the inspection by signing the sheet. The subcontractor shall keep these check sheets on file. All manufacturer's recommendations for inspections and operation shall be followed. The contractor will provide a check sheet if requested.

Handrails and complete midrails shall be kept in good repair. Secondary lifelines shall always be used on power staging, and all personnel on power platforms shall be tied off.

Power platforms shall not be used to hoist material nor shall personnel exit platforms except when the platform is on the ground. If welding or cutting operations are performed on a power platform, the loadlines and lifelines shall be protected.

Manbaskets

Manbaskets shall not be used except when the total exposure of performing the task by another method would be more hazardous. The contractor will inspect manbaskets before initial use, and the subcontractor will inspect them prior to each use. Test lifts and crane requirements will be enforced strictly. Manbasket design shall be approved by the contractor.

A checklist shall be completed and signed during pre-lift meetings, and safety instructions shall be read by personnel entering the basket as well as by the crane operator. Copies of this checklist may be obtained from the contractor.

All manbaskets shall be equipped with overhead protection. When cutting or welding is being done from a manbasket, the rigging shall be protected. During welding, a nonconductive link shall be installed on the load line. Only rigging that has never been used for any other purpose shall be used with the manbasket.

Signs, Barricades, Guardrails, Handrails, Covers, Stairs, Decks, and Ramps

All signs shall be colored properly and labeled as prescribed by the OSHA standard. Signs shall be constructed of metal, fiberglass, or plastic and shall be removed promptly when no longer needed.

The types of barricades permitted on the project include rope, tape, and hard barricades. The color of the barricades shall coincide with the OSHA color classifications. If hazard information is not provided on a barricade, signs or tags shall be attached to it at 20-foot intervals. If hazard information is not printed on barricades at doorways, signs or tags shall be attached to the doorways. Rope, tape, chain, and similar barriers used to designate the boundaries of posted radiological areas shall be yellow and magenta. Construction fences are physical barriers and need not be yellow and magenta.

Tape barricades shall be installed at a height of 42 inches and at a distance of 5 feet from the hazard. If a hazard is more than 10 feet high, the barricade shall be 1 foot farther away for each additional 5 feet of hazard height. Hard barricades may be adjacent to hazards unless the hazard is elevated. Hard barricades shall be 42 inches high, include midrails, and be capable of withstanding a 200-pound force in any direction. If work is taking place beneath a barricaded area, hard barricades shall be equipped with toeboards. If the area below is a walkway or passageway, the area between the barricade midrail and toeboard shall be screened or blocked. All areas where there is a potential for falling objects shall be barricaded.

Turnbuckles shall be used when a barricade is constructed of wire rope.

Guardrails shall be erected whenever a walking surface changes elevation by more than 2 feet. Tape barricades may be used for this purpose, but such a barricade must be 5 feet from the change in elevation. All changes in elevation shall be marked with some kind of warning such as yellow and black tape or fluorescent orange paint. Handrails shall have smooth surfaces or be taped to prevent splinters. All wall openings shall be guarded. When a door opens onto a platform, the width of the door shall not reduce the effective width of the platform to less than 20 inches.

Runs and risers on all stairs shall be constructed in accordance with OSHA regulations. Ramps shall have a maximum angle of 7 degrees.

Stairs leading to office and warehouse trailers shall be anchored firmly and equipped with handrails. Risers, including the top and bottom steps, shall be of equal height.

Floor hole covers shall be labeled "WARNING – TEMPORARY HOLE COVER – DO NOT REMOVE OR STORE MATERIAL." Hole covers shall be cleated and constructed of 0.75-inch plywood with supports 18 inches on center or less.

Roofs

Before any maintenance work is done on roofing, a solid working surface shall be provided with all the openings guarded and skylights protected. A tape barricade shall be erected 6 feet from the edge of any unprotected roof edge. Personnel crossing barricades shall wear a full body harness attached to retractable block lifelines.

Before any demolition work is done on roofing, the subcontractor shall have an engineering survey performed by a registered Professional Engineer.

Cranes

Before they may be used, all cranes shall be inspected by the contractor according to the Mobile Crane Safety Inspection Report in Appendix H that outlines requirements with respect to American National Standards Institute (ANSI) standards, OSHA regulations, and the *Department of Energy Hoisting and Rigging Program Manual* (Ref. 6). Copies of this manual are available upon request.

Cranes that do not pass inspection will not be permitted to operate until all faults are corrected. All cranes must have annual inspections by independent contractors and must be accompanied by a signed copy of the Annual Inspection Checklist. Operators shall complete a pre-operation checklist before each shift. This checklist shall be maintained by the operator and made available to the contractor upon request. The operator shall comply with the manufacturer's specifications and limitations on the operation of any crane. Rated load capacities, warnings, and other instructions shall be legible and conspicuously posted on all cranes. No modifications shall be made to a crane without written approval from the manufacturer. Such approval must be submitted to the contractor.

All cranes shall be set up within 1 degree of level. Unless otherwise approved by contractor, all lifts shall be made on fully extended outriggers, and outrigger pads shall always be used. These pads shall be constructed of hardwood and sized to extend past the outrigger feet. The crane shall be standing on a firm, uniform supporting surface with outriggers fully extended and tires raised free of the supporting surface. If the crane is set on a rubber base, picks shall be performed as specified by the manufacturer's load chart.

For pick and carry operations, the boom must be centered over the front of the crane with the swing brake locked or the mechanical swing lock engaged. Minimum boom point height shall be used and loads shall be carried close to ground surface. No on-tire operation shall be performed with the jib erected. Pick and carry operations shall be done according to manufacturer's recommended load charts and tire pressures.

All picks that exceed 75 percent of the capacity of a crane (the configuration and the chart rated capacity in that configuration), all tandem picks, and all picks adjacent to power lines or over critical process piping require critical lift plans. These plans shall, at a minimum, detail the load to be lifted, the maximum load radius and boom angle, the picking points, the capacity of the rigging, and the rigging configuration. All critical lifts must be approved by the Contractor Hoisting and Rigging Committee.

The weights of all loads must be known, or a load-indicating device must be used. Only qualified operators shall operate cranes. The subcontractor shall submit to the contractor an operator's qualification certificate specific to the equipment to be used. Operators shall be provided with rigging and crane handbooks. All cranes shall be equipped with two-anti-blocking devices. All cranes equipped with outriggers shall be marked indicating full extension, and telescoping boom cranes shall have markings on the boom indicating the length of boom extended. Each crane shall have a 10-pound dry chemical fire extinguisher rated A:B:C.

All lattice boom cranes with structural damage to cords and/or lacings shall be immediately removed from service. All structural repairs to damaged booms shall be approved by the crane manufacturer and shall be performed in accordance with specifications and procedures prescribed by the crane manufacturer. Following all repairs to a boom, the crane shall be load-tested prior to initial use. Test loads shall not exceed 110 percent of the rated load at any working radius. Testing shall be in accordance with Society of Automotive Engineers (SAE) recommended practice, *Crane Load Stability Test Code J765* (April 1961).

Wire rope inspections shall be made per the *Department of Energy Hoisting and Rigging Program Manual* (Ref. 6) and records shall be maintained by the operator and made available to the contractor upon request.

Cranes shall be operated only by the following qualified/competent personnel: designated operators, trainees under the direct supervision of a qualified trainer, maintenance and test personnel when necessary in the performance of their duties, and crane-qualified inspectors.

Crane operators shall be in visual or radio contact with a qualified flag person before and during every lift. If visual or radio contact is interrupted for any reason, the operator shall stop the lift until full contact is restored.

The crane shall be capable, within manufacturer specifications, of fulfilling all requirements of the work without endangering personnel or equipment.

The operator shall check the load line brake and the crane for stability when the load is only inches from the ground before proceeding with any lift.

The operator shall be responsible for the equipment and load during a lift or pick. The operator shall not attempt any lift which might compromise the safety of the operation. The operator shall ensure that proper rigging techniques are used prior to lift. A suspended load shall never be left unattended. Cranes shall be operated smoothly, avoiding sudden stops and starts. The hoist line shall be vertical at all times. Personnel shall not stand or pass under suspended loads. Personnel shall not be allowed to ride the hook or load. The boom hoist drum pawl shall be engaged at all times except when lowering the boom. Operators shall ensure that all frequent and periodic inspections are current before operating the crane.

Safety latches on hooks shall be serviceable, and two pairs of orange gloves shall be kept on each crane for use by flagmen.

An operator shall not leave the control station of a crane during a lift or pick except under the following conditions:

- When the load is lowered or raised to a safe landing area with no tension on the load line
- After placing all brakes, pawls, switches, and clutches in a safe position
- After turning the crane over to another qualified operator
- After supporting the load by other means, such as cribbing, manufacturer sleds or frames, suspended rigging, or another crane.

Employees shall not get on or off a crane while it is in motion. Adjustments, repairs, or lubrication shall not be permitted on moving equipment unless it is required by manufacturer recommendations.

Tag lines shall be required on all loads. Use as many tag lines as necessary to adequately control the load during the lift and while landing.

Unless installed by the manufacturer, tool boxes, oil cans, choker racks, water coolers, or other items shall not be placed within the swing radius of the counterweight. The oiler shall stand clear of the swing radius and assist the operator in keeping other employees outside the swing radius. The swing radius of the rotating counterweight shall be barricaded with a complete "no entry" barricade.

Crane load charts and the operator's manual for that particular crane configuration shall be located in the cab of each crane along with rated load capacities, recommended operating speeds, special hazard warnings, or instructions.

If a rental or subcontractor crane is to be used and the load chart is 85 percent capacity, the chart shall be reduced to 75 percent. This is done by establishing 100 percent capability of the crane and reducing the weight by 25 percent. For hoisting of personnel, 50 percent maximum is allowed.

The superintendent of the crane operator shall:

- Ensure that the qualified operator is fit for duty
- Check the area with the operator for any unusual conditions that could interfere with the lift or pick
- Conduct a safety briefing session concerning the lift or pick
- Tell the operator to stop the lift if there are any questions or concerns and contact the foreman immediately
- Check the mechanical and operating condition of the crane with the operator
- Assist the operator as needed for difficult or critical lifts
- Make sure the counterweight is barricaded
- Coordinate the lift with the operator and the flagmen of the crew using the crane.

The foreman of the crew using the crane shall ensure that the area is checked for any unusual conditions and take action as needed to ensure a safe lift. The foreman shall give a lift-safety briefing session to the crew and shall include the operator in lift instructions. One or more flagmen, who are specifically trained and qualified in accordance with contractor hoisting, rigging, and operating procedures shall be assigned, as needed, to provide all signals to the crane operator and coordinate signals and other means of communication between multiple flagmen and the operator. Any deviations for work activities shall be approved by the contractor.

All riggers/signalmen shall be trained properly, qualified, and provided with a rigging handbook. Training records shall be submitted to the contractor. Flagmen shall be identified with an orange vest. They shall:

- Clear the lift path prior to signaling the operator to start the lift

- Be present during the entire lift until replaced by another qualified flagman
- Constantly be aware of the location of the load in relation to line of travel and potential interferences
- Watch for unauthorized personnel in the lift area or within the swing radius of the crane counterweight.

Flagmen shall:

- Assist the operator in checking for interferences within the swing radius of the counterweight
- Assist the operator in checking the boom location in relation to other interferences, obstructions, or power lines
- Be in full view of the operator or in direct communication by radio or other approved sound-powered phones
- Give clear hand or voice directions
- Coordinate responsibility with other flagmen if more than one is needed for the lift
- Stop the lift if any unusual condition or event occurs that could jeopardize the safe completion of the lift.

No one shall be allowed to stand or pass under a suspended load.

If an onsite crane is involved in an accident or incident, the equipment, rigging, and load are not to be moved (except for life-saving activities) until after a contractor investigation has been completed.

Crane Inspection

Applicable ANSI B30 series daily, monthly, quarterly, semiannual, annual, and special inspections shall be completed prior to operating any crane. All inspections shall be completed by a qualified inspector following manufacturer's recommendations and specifications.

Crane inspections shall include, at a minimum, all control mechanisms for maladjustment interfering with proper operation, excessive wear of components, and contamination by lubricants; all safety devices for malfunction; hydraulic, air, oil, and coolant systems for leaks; proper operation of electrical systems and condition of wiring; crane hooks for deformations or cracks; rope reeving in compliance with crane manufacturer's

recommendations; and wire rope condition. Kinking, crushing, birdcaging, unstranding, corrosion, broken wires, broken strands, excessive wear, reduction of rope diameter, or improperly applied end connections are factors which determine whether further use of rope would constitute a safety hazard.

Completed daily, monthly, and annual inspection forms shall be available in a weather-proof container on the crane at all times. Copies of all completed forms shall be maintained for every crane.

Mast or Tower Crane

A special safety harness continuously attached to a lifeline shall be provided and used by all personnel climbing to the crane cab. Only one person shall be permitted in the cab of the mast crane. Exceptions shall be approved by the contractor.

Loads shall be lifted with the load line only. The boom shall be in a fixed position before raising the load line.

The operator shall shut down the crane if the wind velocity reaches the maximum recommended by the manufacturer, as measured by the anemometer mounted on the crane.

Movement of Cranes (Under Their Own Power)

The superintendent of the crane operator shall assign a qualified crew to the crane and ensure the proper operating and mechanical condition of the crane.

The superintendent shall ensure the proper loading and securing of the crane on the lowboy; provide a qualified flagman for signaling in close quarters, such as turns, gates, intersections, congested areas, overtaking traffic, etc.; and ride as escort with the responsible supervisor in the escort vehicle immediately in front of the tractor, to assist the supervisor in observing for anticipated obstructions, interferences, and road problems.

The foreman of the electrical escort (where electrical escort is required) shall ensure that a fully qualified electrical lineman escort is assigned and shall instruct the assigned lineman fully as to his position in the caravan (number two directly behind patrol). The lineman's responsibilities include observing all potential electrical or overhead line interferences, relaying such information to the escort superintendent before questionable conditions become a problem, and observing "on foot" the interferences at gates, congested turns, and other constricted areas.

A superintendent or safety supervisor shall be responsible for each crane movement and shall personally direct planning of the movement with consideration to routing, turns, speeds, stops, terrain, weather conditions, and traffic. The safety supervisor or superintendent shall inspect and approve the positioning and securing of the crane on the

lowboy before movement begins; halt the movement operation if any question arises concerning safe movement of the crane; and ensure that proper permits are completed before going into controlled areas.

The foreman of the crane operator shall also ensure the proper operating and mechanical condition of the crane, know the hazards on the travel route, include in the safety briefing for the operator and flagmen that one or more flagmen shall escort the crane when en route over congested roads, and minimize the need for travel during heavy traffic periods. An escort vehicle equipped with yellow caution lights may be used when traveling long distances or when the boom or any of its attachments extends more than 20 feet in front of the crane. The foreman shall ensure that travel speed is commensurate with traffic and road conditions, that a qualified electrical lineman escort is available if the crane is to come within 20 feet of any power lines, and that all cranes are equipped with a horn signal system (i.e., one blast to move forward, two blasts to stop, and three blasts to back up).

The flagman shall be qualified and competent, maintain a position in full view of the operator and use proper hand signals, wear a high-visibility vest and high-visibility gloves, and watch for any unusual condition or event that could interfere with the safe movement of the crane.

The safety supervisor shall direct planning of the move personally; consider routing, turns, speeds, stops, terrain, and weather conditions; and ensure compliance with the plan for movement.

Critical Lifts

The superintendent of the crane operator shall prepare a critical lift plan for each critical lift. The following information shall be included:

- Reason for the necessity of the critical lift
- Type of crane
- Crane location
- Load location
- Boom angle
- Radius
- Weight of total load (weighing may be necessary)
- Dimensions of load
- Attachment points for rigging
- Obstructions in path of load
- Rigging hardware and configuration
- Crane operator qualifications
- Crane load chart (or copy thereof)
- Other equipment or cranes involved.

The Contractor Hoisting and Rigging Committee shall approve all critical lifts. If any deviation from crane manufacturer recommendations is anticipated, approval shall be secured from the manufacturer and included for evaluation.

Critical lifts are lifts that require exceptional care because of size, weight (any lift with a total weight in excess of 75 percent of the crane's load chart), close-tolerance installation, high susceptibility to damage, use of two cranes, or other unusual factors. An example of a critical lift is one in which a collision, upset, or drop could result in:

- An unacceptable delay to the schedule or another significant program impact due to damage
- A significant release of radioactive material or other hazardous material
- An unacceptable risk of injury or a significant adverse health impact
- Undetectable damage that would jeopardize future operations or the safety of a facility.

Crane Work Near Overhead Power Lines

When planning crane placements, every effort shall be made to select locations that are least likely to allow any part of the crane or load to come within 15 feet of a power line by rotation, boom extension/elevation, or crane movement.

When frequent, repetitive crane work is to be performed near overhead power lines, consideration shall be given to having the lines relocated or de-energized.

When the job requires that a crane or the load come within 10 feet of an overhead power line, a written plan shall be prepared. All power lines shall be de-energized and grounded whenever possible.

The minimum clearance to any power line rated at 50 kV or below shall be 10 feet. For lines rated over 50 kV, minimum clearance shall be as required per OSHA 29 CFR 1926.550.

A written plan shall be developed to specify job details and special safety measures provided to ensure worker safety. The plan shall be approved by the contractor, who shall review the measures taken to make the job safe (e.g., special tools, equipment, grounding). Written plans shall include unexpected situations (e.g., equipment drawing arcs, emergency responses, electrical shocks, the need to de-energize the line quickly) and instructions for handling them.

The following shall be considered before starting work within 10 feet of overhead energized power lines:

- Allow daylight work only
- Allow no work on a rainy or foggy day
- Place a rubber blanket on the line
- Provide lineman's gloves and boots for operators and other exposed persons (riggers, etc.)
- Provide rubber boots for operators
- Place rubber blanket on the operator's seat
- Insulate the crane boom
- Provide insulated tag lines
- Ground cranes per OSHA 29 CFR 1926.550
- Allow no one on a rig but the operator
- Post a special signalman to maintain line clearance
- Provide detailed drawings and controls to ensure that equipment does not violate minimum clearances.

Cranes and other heavy equipment shall not be operated within 3 feet of power poles or guy wires supporting these poles. Guy wires within the swing radius of the crane or load shall be flagged with yellow tape.

Crane Work Over Critical Piping

Work over such systems shall require a written plan.

The contractor shall have ultimate authority over operational facilities, and shall also be responsible for designating which service piping shall be treated as critical piping.

Rigging

General

All rigger's signal men shall be trained properly and provided with a rigging handbook. Documentation of training shall be provided to the contractor. All rigging shall be performed in accordance with the *Department of Energy Hoisting and Rigging Program Manual* (Ref. 6), which will be available from the contractor upon request. Major rigging operations must be planned and supervised by competent personnel to ensure that the best methods and most suitable equipment are employed.

The contractor shall have the authority to cancel hoisting and rigging operations based on consideration of weather, condition of lifting hardware, electrical line clearances, or any other factor that, in the judgment of the contractor, may adversely affect the successful conclusion of the lift. All rigging must be protected from flame cutting and electric welding operations and from contact with solvents and chemicals.

Equipment Inspection and Testing

When specially fabricated devices are required for hoisting and rigging operations (e.g., lifting beams, material baskets, and spreader beams), the design and calculations for the device shall be reviewed and approved by the contractor.

All rigging shall be inspected by a competent person before each use and marked as inspected at least annually. All rigging shall be labeled clearly with its capacity. All rigging shall be stored in a rigging loft or an equivalent area where it will not be exposed to the elements.

Job-built rigging and hoisting equipment shall be tested onsite at 125 percent capacity, and such tests shall be observed and documented by the contractor. In addition, drawings of such rigging showing weld details and load capacities shall be submitted to the contractor and approved before the rigging is used.

Hoisting and rigging equipment for material handling shall be inspected visually prior to use on each shift, and as necessary during its use to ensure that it is safe. Hoisting and rigging equipment shall be load-tested at least annually by a competent person, who, by training and experience, is capable of recognizing defects and taking the appropriate action to correct or eliminate them. Inspections shall be documented and made available to the contractor.

Safe Working Loads

Hoisting and rigging equipment shall not be loaded in excess of its recommended safe working load, as prescribed in Tables H-1 through H-20 of OSHA 29 CFR 1926, Subpart H, (1926.251, *Rigging Equipment for Material Handling*). Special hoisting devices, slings, chokers, hooks, clamps, or other lifting accessories shall be marked to indicate the safe working loads and shall be proof-tested prior to initial use to 125 percent of their rated load.

The load weight must be determined before it is rigged. The gross load which is the sum of the weight of the rigging, block, hooks, lifting beam, stowed or erected jibs, headache ball, other elements of rigging or equipment and the load, must be accounted for when determining hoisting equipment. Safe working loads of hoisting equipment apply only to freely suspended loads on plumb hoist lines. If hoist line is not plumb, additional side loads will compromise the stability and introduce stresses which exceed equipment designs. Rapid swinging of loads also adds additional stresses and minimizes stability. The load must always be directly below the boom point or upper load block.

The center of gravity must be below the hook and below the lowest point of attachment to ensure stability. Softeners must be used to protect slings at sharp corners. Sharp bends, pinching, and crushing should be avoided. The eye section of wire rope slings must not be bent around corners.

Alloy Steel Chains

Chains shall not be used for lifting except as part of a chainfall or come-along device.

Wire Ropes

Wire ropes shall be kept in good repair and without deformities. Wire ropes with visual signs of kinking, crushing, unstranding, birdcaging, main strand displacement, core protrusion, loss of rope diameter, unevenness of outer strands, corrosion, heat damage, abrasion, broken wires or strands and cracked, worn, or deformed end attachments should be considered in evaluation of sling replacement. Wire rope shall not be used if in one rope lay there are 10 randomly distributed broken wires or five broken wires in one strand.

Tables H-3 through H-14 of OSHA 29 CFR 1926, Subpart H, (1926.251, *Rigging Equipment for Materials Handling*) shall be used to determine the safe working loads of various sizes and classifications of improved plow steel wire rope and wire rope slings with various types of terminals. For sizes, classifications, and grades not included in these tables, the safe working load recommended by the manufacturer for specific, identifiable products shall be followed, provided that a safety factor of not less than 5 is maintained. Wire rope with protruding ends of strands in splices on slings and bridles shall be covered or blunted. Wire rope application use limitations shall be in accordance with 29 CFR 1926.251(c)(4). When U-bolt wire rope clips are used to form eyes, Table H-20 of OSHA 29 CFR 1926, Subpart H, (1926.251, *Rigging Equipment for Materials Handling*) shall be used to determine the number and spacing of clips. A minimum of three clips shall always be used. More clips may be needed when large-dimension wire is used.

Slings

Synthetic slings shall be maintained carefully. Any synthetic sling with the red warning line exposed is to be removed immediately regardless of the extent of the exposure and the use of the sling.

Slings should not be dragged from beneath loads. Knotted and kinked slings will be considered permanently damaged and shall be removed from the site. When estimating sling capacity using multi-legged slings, only two of the legs shall be considered to carry the full load. All loose pieces of material shall be removed from the load prior to moving. Gloves shall be worn when handling wire rope. Hands shall be kept free from pinch points as slack is taken up. The load shall be controlled at all times. Personnel shall keep body parts out of pinch points. Tag lines shall be used.

Tables H-15 through H-18 of OSHA 29 CFR 1926, Subpart H, (1926.251, *Rigging Equipment for Materials Handling*), shall apply when using natural or synthetic fiber rope slings.

All splices in rope slings shall be made in accordance with fiber rope manufacturer's recommendations and 29 CFR 1926.251(d)(2).

Synthetic webbing (nylon, polyester, and polypropylene) shall be identified by the name of the manufacturer, the rated capacities for the type of hitch, and the type of material.

Synthetic web slings shall be removed from operation immediately if there are signs of acid or caustic burns, melting or charring of any part of the sling surface, snags, punctures, tears or cuts, broken or worn stitches, distortion of fittings, discoloration or rotting, or red warning line showing.

Shackles, Hooks, and Bolts

Table H-19 of OSHA 29 CFR 1926, Subpart H, (1926.251, *Rigging Equipment for Materials Handling*) shall be used to determine the safe working loads of various sizes of shackles.

Only one-eye hooks shall be used, and hooking back to the load line will not be permitted in either mechanical rigging or hand rigging. Only one eye of a sling shall be used in a hook. A shackle shall be used to hold two or more eyes. The pin of the shackle should be placed in the hook with the eyes of chokers bearing on the shank.

Only shouldered eyebolts shall be used, except where it is not possible due to the configuration of the item to which the eyebolt is attached. Unshouldered eyebolts shall not be used when the load is to be lifted at an angle, because they are subjected to bending, and the load they can safely carry is severely reduced. Eyebolts should never be welded. Shouldered eyebolts must be installed with the shoulder at a right angle to the axis of the hole and must contact the working surface to keep bending to a minimum; the loads should be applied to the plane of the eye. The tapped hole for screwed eyebolts shall have a minimum depth of one and one-half times the bolt diameter. The point of a hook must never be inserted in an eyebolt; a shackle must be used instead. A sling must not be reeved through pairs of eyebolts. One single leg should be attached to each eyebolt.

The manufacturer's recommendations shall be followed in determining the safe working loads of the various sizes and types of specific and identifiable hooks. All hooks for which no applicable manufacturer's recommendations are available shall not be used.

Shackles and hooks shall be constructed of forged alloy steel with the identifiable load rating and manufacturer on the shackle or hook. All hooks except for sorting hooks and sliding choker hooks shall be equipped with a safety latch.

Knots

Knots shall not be tied in rigging for any purpose, and all rigging shall be used only for its intended purpose. Rigging used to hoist manbaskets shall be identified as such and not used for any other purpose.

Weather Conditions

No rigging or hoisting operation shall be carried out when weather conditions could cause the operation to be hazardous to personnel or property. The size and shape of loads must be examined to determine if a hazard exists during high winds. Wind loading may not exceed equipment capacity. When wind speeds reach 25 to 30 mph, or when visibility is impaired by darkness, snow, fog, or rain, the operation shall be suspended.

When the temperature is below freezing, caution must be used to ensure that no part of the hoisting equipment is shock loaded, as steel fracture can result. Stress factors that reduce rigging capacity and safe working load must be considered when using slings at angles or when slings are choked.

Motor Vehicles and Heavy Equipment

Drivers and/or operators of vehicles and heavy equipment must have the appropriate state license certifying their qualifications to drive or operate each piece of equipment or vehicle. When state certification is not available for a piece of heavy equipment, the subcontractor shall submit to the contractor a certificate of operator qualification for each operator, listing each piece of heavy equipment that the operator is qualified to operate.

Drivers shall be responsible for the safety of all passengers and the stability of materials being hauled. Personnel shall not mount or dismount moving vehicles. Personnel shall not ride in the bed of any vehicle. Every passenger in a motor vehicle shall have a safe place to ride. The use of seat belts shall be mandatory when operating or riding in vehicles.

Unattended vehicles and heavy equipment shall not be left running. If the operator is to get out of or off of the equipment, it must be shut down properly.

All blades and buckets shall be lowered when the operator leaves the cab unless physically locked or properly blocked.

Heavy equipment shall be maintained in proper operating condition at all times. All machines shall be equipped with roll-over protective structure (ROPS) cabs. Operators shall be trained in the proper method of working on slopes.

All heavy equipment with ROPS cabs shall be labeled as required by 29 CFR 1926.1000. Seat belts shall be installed and used in all equipment with ROPS attachments except for compactors and rubber-tired skid steer equipment. All heavy equipment shall be equipped with functioning back-up alarm systems that are clearly audible above surrounding noise.

All equipment and tools shall be subject to an inspection, conducted by the contractor, upon arrival at the site and prior to being placed into service. Operators shall perform daily inspections of machinery and equipment. Records of these inspections shall be made and kept by the subcontractor. These records shall be available to the contractor upon request. Defective equipment that could endanger personnel or the environment shall be tagged defective, and repaired immediately or removed from service. All machinery shall be subject to inspection by the Contractor Safety Department. Owners' manuals shall be made readily available upon contractor request.

Oils or other fluids (except water) that leak onto the ground shall be cleaned up by the subcontractor, and the contaminated soil shall be disposed of in accordance with the Environmental Cleanup Plan.

All equipment is designed for a particular function and shall be operated according to the manufacturer's recommendations and within the manufacturer's limitations. For lifting operations with equipment other than cranes, prior written approval must be obtained from the contractor.

Documenting Task Completion

Upon completion of the excavation, the subcontractor shall prepare as-builts and transmit them along with the completed permit, SWPs, and/or TaSSAs to the construction engineer.

Enforcing Permit Requirements

Failure to obtain a permit, or noncompliance with the conditions required by the approved permit, may result in an operational suspension of the activity until an approved permit is issued and/or a CAS-21 Safety Violation Notice is completed.

Demolition

All personnel safeguards that apply to the construction of a building will be required during demolition. If a worker is exposed to a hazard, the hazard shall be abated or personnel shall be removed from the hazard area. Fall hazards — such as floor openings, unprotected platforms, and wall openings — to which employees will be exposed shall be mitigated.

An engineering survey must accompany the Safe Work Plan. However, this survey is not a substitute for the Safe Work Plan. The professional engineer who authors the engineering survey must tour all the buildings that are included in the survey.

Use of explosives may be permitted for demolition of uncontaminated structures; however, a detailed Safe Work Plan will be required before such use is approved.

As indicated in the subcontract specifications, the subcontractor shall use water spraying or other contractor-approved methods as necessary to suppress dust emissions.

Traffic Control

The subcontractor shall be responsible for orderly traffic control on the job site. All traffic control measures on public roadways shall be in accordance with Transportation Department regulations for use of flagmen, construction barriers, and appropriate distance requirements. The subcontractor shall provide traffic signs and/or signalmen where and when necessary to protect personnel and/or the general public.

APPENDIX E
Site Tailgate Meeting and Exclusion Zone Entry Log

APPENDIX E
SITE TAILGATE MEETING and EXCLUSION ZONE ENTRY LOG

Facility: _____
Date: _____
Client: _____ Time: _____ Project Number: _____
Specific Location: _____
Type of Work: _____
Chemicals Brought to Site: _____

MSDSs Available: Yes _____ No _____

HEALTH AND SAFETY TOPICS PRESENTED

Protective Clothing/Equipment: _____
Chemical Hazards: _____
Physical Hazards: _____
Emergency Procedures: Apply First Aid and notify Health and Safety immediately
Hospital/Clinic: _____
Hospital Address: _____
Special Equipment: _____
Evacuation Route: _____

ATTENDEES

| Entered Exclusion Zone? (Y/N) | NAME (Printed) | SS# | COMPANY | SIGNATURE |
|-------------------------------------|----------------|-------|---------|-----------|
| _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ |

MEETING CONDUCTED BY:
NAME (printed) _____
(signature) _____

SITE PERSONNEL VISITOR LOG

[illegible]

APPENDIX G
Material Safety Data Sheet (MSDS) Information

APPENDIX G - MSDS INFORMATION

Benzene

Citranox

Diesel Fuel No. 1-D

Diesel Fuel No. 2-D

Ethylbenzene

Gasoline

Hexane

1-Hexene

Hydrochloric Acid

Hydrogen

Isobutylene

Kerosene

Methane

Methanol

Nitric Acid

Sodium Hydroxide

Sulfuric Acid

Toluene

CHEMICAL NAME
BENZENE

FORMULA
C6H6

SYNONYMS
BENZOL
CYCLOHEXATRIENE
COAL TAR NAPHTHA
PHENYL HYDRIDE
NCI-C55276
BENZINE
BENZOLE
UN 1114
(6)ANNULENE
BENZIN
BENZOLENE
BICARBURET OF HYDROGEN
CARBON OIL
COAL NAPHTHA
MINERAL NAPHTHA
MOTOR BENZOL
NITRATION BENZENE
PHENE
PYROBENZOL
PYROBENZOLE
OHS02610

PERMISSIBLE EXPOSURE LIMIT
10 PPM OSHA TWA; 10 PPM (30 MG/M3) ACGIH TWA
25 PPM (75 MG/M3) ACGIH STEL (NOTICE OF INTENDED CHANGE 85-86)
25 PPM OSHA CEILING; 50 PPM/10 MINUTES OSHA PEAK
10 PPM/60 MINUTES NIOSH RECOMMENDED CEILING
HUMAN CARCINOGEN (NTP, IARC, OSHA); SUSPECT HUMAN CARCINOGEN (ACGIH)
ANIMAL CARCINOGEN (IARC); POSITIVE CARCINOGEN IN RATS/MICE (NCI)
MUTAGENIC DATA (RTEC); TERATOGENIC DATA (RTEC)
AQUATIC TOXICITY RATING 2 (TLM96 10-100 PPM)
TLM96 - FATHEADS 32-33.47 PPM, BLUEGILLS 22.49 PPM, GUPPIES 36.60 PPM
TLM96 - GAMBUSIA AFFINIS 386; TLM - RAINBOW TROUT 15.4 PPM
KILL, 1HR - LEPOMIS HUMILIS 35-37 PPM
CERCLA HAZARD RATINGS - TOXICITY 3 - IGNITABILITY 3 - REACTIVITY 0 -
PERSISTENCE 1

TOXICOLOGY: BENZENE IS A PRIMARY SKIN IRRITANT, CENTRAL NERVOUS SYSTEM
DEPRESSANT, BONE MARROW DEPRESSANT, AND LEUKEMOGEN.
ACUTE BENZENE INTOXICATION FROM INHALATION OR INGESTION INITIALLY
PRODUCES EXCITATION AND EUPHORIA, FOLLOWED BY HEADACHE, DROWSINESS,
DIZZINESS, VOMITING, DELIRIUM, AND UNCONSCIOUSNESS. SEVERE EXPOSURE
CAUSES BLURRED VISION, TREMORS, SHALLOW AND RAPID RESPIRATION, VENTRICU-
LAR FIBRILLATION, PARALYSIS, AND CONVULSIONS. LIVER AND KIDNEY DAMAGE
MAY OCCUR.

CHRONIC INHALATION POSES THE GREATEST HAZARD. SYMPTOMS ARE HEADACHE, ANOREXIA, DROWSINESS, NERVOUSNESS, PALLOR, ANEMIA, BLEEDING UNDER THE SKIN AND EYES, AND REDUCED CLOTTING ABILITY. BONE MARROW DAMAGE MAY BE EVIDENT. BENZENE WORKERS ARE 5 TO 10 TIMES AS LIKELY TO DEVELOP LEUKEMIA.

SKIN CONTACT WITH BENZENE DECREASES THE SKIN, CAUSING CRACKING AND SCALING. EXPOSURE HAS PRODUCED OPTIC NEURITIS, ATROPHY, VISUAL IMPAIRMENT, EDEMA, AND CATARACTS. DIRECT CONTACT CAUSES TRANSIENT INJURY.

THE ODOR AND IRRITATION PROPERTIES DO NOT PROVIDE ADEQUATE WARNING OF TOXIC CONCENTRATIONS.

THE THRESHOLD LIMIT VALUE IS BASED ON THE LOWEST LEVEL ACHIEVABLE.

| | |
|-------------------------------|------------------------------|
| ORL-HMN TDLO: 130 MG/KG | UNK-MAN LDLO: 194 MG/KG |
| IHL-HMN LCLO: 20000 PPM/5 MIN | ORL-RAT LD50: 4894 MG/KG |
| IHL-HMN TCLO: 210 PPM | ORL-MUS LD50: 4700 MG/KG |
| IHL-HMN TCLO: 100 PPM | IHL-RAT LC50: 10000 PPM/7 HR |

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONCENTRATION

2000 PPM

OSHA/NIOSH

PHYSICAL DESCRIPTION

COLORLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID; AROMATIC ODOR

CHEMICAL AND PHYSICAL PROPERTIES

MOLECULAR WEIGHT: 78.08

BOILING POINT AT 1 ATM, F: 176 F

SOLUBILITY IN WATER, G/100 G WATER AT 20C: 820 PPM

FLASH POINT, CLOSED CUP, F (OR OPEN CUP IF 0C): 12 F

VAPOR PRESSURE @ 20 C, MMHG: 75 MM

MELTING POINT, F: 42 F

UPPER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: 7.1%

LOWER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: 1/3%

AUTOIGNITION TEMPERATURE: 928 F

SPECIFIC GRAVITY: 0.8765

VAPOR DENSITY (AIR=1): 2.8

ODOR THRESHOLD: 1.5-5 PPM

OCTANOL/WATER PARTITION COEFFICIENT: 2.13

INCOMPATIBILITIES

STRONG OXIDIZERS

ZINC IN PRESENCE OF STEAM

CHLORINE TRIFLUORIDE

OZONE

SULFURIC ACID

POTASSIUM

CHROMIC ANHYDRIDE

DUST/VAPORS MAY FORM EXPLOSIVE MIXTURE WITH AIR

PERSONAL PROTECTIVE EQUIPMENT

EMPLOYERS SHALL PROVIDE AND ENSURE THAT EMPLOYEES USE APPROPRIATE PROTECTIVE CLOTHING AND EQUIPMENT NECESSARY TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE. FACE SHIELDS SHALL COMPLY WITH 29CFR1910.133(A)(2), (A)(4), (A)(5), AND (A)(6).

EMPLOYERS SHALL ENSURE THAT CLOTHING WET WITH THIS SUBSTANCE IS PLACED IN CLOSED CONTAINERS FOR STORAGE UNTIL IT CAN BE DISCARDED OR UNTIL THE EMPLOYER PROVIDES FOR THE REMOVAL OF THE CONTAMINANT FROM THE CLOTHING. IF THE CLOTHING IS TO BE LAUNDERED OR OTHERWISE CLEANED TO REMOVE THE CONTAMINANT, THE EMPLOYER SHALL INFORM THE PERSON PERFORMING THE CLEANING OPERATION OF THE HAZARDOUS PROPERTIES OF THE SUBSTANCE. PROTECTIVE CLOTHING AND EQUIPMENT NECESSARY TO PREVENT REPEATED OR

ACGIH "GUIDELINES FOR SELECTION OF CHEMICAL PROTECTIVE CLOTHING" INDICATES THE FOLLOWING MATERIALS AND PROTECTIVE RATINGS BY INDEPENDENT VENDORS AGAINST BENZENE:

EXCELLENT/GOOD:
VITON

GOOD/FAIR:
POLYVINYL ALCOHOL

FAIR/POOR:
BUTYL RUBBER
NATURAL RUBBER
NEOPRENE
NEOPRENE/NATURAL RUBBER
NITRILE
POLYETHYLENE
CHLORINATED POLYETHYLENE
POLYURETHANE
POLYVINYL CHLORIDE

FAIR/GOOD:
NEOPRENE/STYRENE-BUTADIENE
NITRILE/POLYVINYL CHLORIDE
STYRENE-BUTADIENE RUBBER
FLUORINATED ETHYLENE PROPYLENE POLYMER OR POLYTETRAFLUOROETHYLENE
CHLORINATED NATURAL RUBBER
SARANEX

GOGGLES

EMPLOYERS SHALL PROVIDE AND ENSURE THAT EMPLOYEES USE SPLASH-PROOF SAFETY GOGGLES WHICH COMPLY WITH 29CFR1910.133(A)(2)-(A)(6) WHERE THIS LIQUID MAY CONTACT THE EYES.

WASHING CHEMICALS FROM THE SKIN

EMPLOYERS SHALL ENSURE THAT EMPLOYEES WHOSE SKIN BECOMES CONTAMINATED WITH THIS SUBSTANCE PROMPTLY WASH OR SHOWER WITH SOAP OR MILD DETERGENT AND WATER TO REMOVE ANY CONTAMINANT FROM THE SKIN.

ROUTINE CHANGING OF WORK CLOTHING
NOT REQUIRED

CLOTHING REMOVAL FOLLOWING ACCIDENTAL CONTAMINATION

EMPLOYERS SHALL ENSURE THAT ANY CLOTHING WHICH BECOMES WET WITH THIS FLAMMABLE LIQUID BE REMOVED IMMEDIATELY AND NOT REWORN UNTIL THE SUBSTANCE IS REMOVED FROM THE CLOTHING.

SPECIFIC EMERGENCY PROVISIONS

NONE REQUIRED

RESPIRATOR SELECTION (UPPER LIMIT DEVICES PERMITTED)

10 PPM

- SUPPLIED-AIR RESPIRATOR
- SELF-CONTAINED BREATHING APPARATUS

50 PPM

- SELF-CONTAINED BREATHING APPARATUS
WITH A FULL FACE-PIECE
- SUPPLIED-AIR RESPIRATOR
WITH A FULL FACE-PIECE, HELMENT, OR HOOD

ESCAPE

- GAS MASK
PROVIDING PROTECTION AGAINST SPECIFIC COMPOUND OF CONCERN
(CHIN-STYLE OR FRONT- OR BACK-MOUNTED CANISTER)
- SELF-CONTAINED BREATHING APPARATUS

1000 PPM

- SUPPLIED-AIR RESPIRATOR
- TYPE 'C' SUPPLIED-AIR RESPIRATOR
- SUPPLIED-AIR RESPIRATOR
OPERATED IN PRESSURE-DEMAND, POSITIVE-PRESSURE, OR CONTINUOUS-FLOW
MODE

FIREFIGHTING

- SELF-CONTAINED BREATHING APPARATUS
WITH A FULL FACE-PIECE
OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE

2000 PPM

- TYPE 'C' SUPPLIED-AIR RESPIRATOR
- SUPPLIED-AIR RESPIRATOR
WITH A FULL FACE-PIECE
OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE
WITH A FULL FACE-PIECE, HELMENT, OR HOOD
OPERATED IN CONTINUOUS-FLOW MODE

ROUTE OF ENTRY INTO BODY

INHALATION

SKIN ABSORPTION

INGESTION

SKIN OR EYE CONTACT

SYMPTOMS

EYE IRRITATION

RESPIRATORY IRRITATION

PURPURA

DERMATITIS

VESICULATION

ERYTHEMA

EPISTAXIS

PHARYNGITIS

RESPIRATORY EDEMA

CENTRAL NERVOUS SYSTEM STIMULATION

RAPID RESPIRATION

NERVOUSNESS

DELIRIUM

EUPHORIA

VERTIGO

CENTRAL NERVOUS SYSTEM DEPRESSION

HEADACHE

FATIGUE

WEAKNESS

DIZZINESS

DROWSINESS

CONFUSION

ANGINA

PALLOR

STRABISMUS

LEUKOPENIA

MYDRIASIS

NAUSEA

VOMITING

ANOREXIA

WEIGHT LOSS

TREMORS

COMATOSE

VENTRICULAR FIBRILLATION

CARDIAC PARALYSIS

RESPIRATORY PARALYSIS

CONVULSIONS

LEUKOCYTOSIS

MONOCYTOSIS

THROMBOCYTOPENIA

HEMOLYTIC ANEMIA

HEMATURIA

BONE MARROW DEPRESSION

BONE MARROW HYPERPLASIA

LEUKEMIA
APLASTIC ANEMIA
KIDNEY DAMAGE
LIVER DAMAGE
BRAIN DAMAGE
REPRODUCTIVE EFFECTS

FIRST AID PROCEDURES FOLLOWING EXPOSURE

IF THIS CHEMICAL GETS INTO THE EYES, IMMEDIATELY WASH THE EYES WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING THE LOWER AND UPPER LIDS. GET MEDICAL ATTENTION IMMEDIATELY. CONTACT LENSES SHOULD NOT BE WORN WHEN WORKING WITH THIS CHEMICAL.

IF THIS CHEMICAL GETS ON THE SKIN, IMMEDIATELY WASH CONTAMINATED SKIN WITH SOAP OR MILD DETERGENT & WATER. IF THIS CHEMICAL SOAKS CLOTHING, IMMEDIATELY REMOVE CLOTHING & WASH SKIN WITH SOAP OR MILD DETERGENT & WATER. GET MEDICAL ATTENTION PROMPTLY.

IF A PERSON BREATHES IN LARGE AMOUNTS OF THIS CHEMICAL, MOVE THE EXPOSED PERSON TO FRESH AIR AT ONCE. IF BREATHING HAS STOPPED PERFORM ARTIFICIAL RESPIRATION. KEEP THE AFFECTED PERSON WARM AND AT REST. GET MEDICAL ATTENTION AS SOON AS POSSIBLE.

WHEN THIS CHEMICAL HAS BEEN SWALLOWED, DO NOT INDUCE VOMITING. REMOVE BY GASTRIC LAVAGE AND CATHARSIS.

BENZENE/TOLUENE/XYLENE EXPOSURE:

EMERGENCY TREATMENT - REMOVE FROM EXPOSURE. GIVE ARTIFICIAL RESPIRATION WITH OXYGEN. REMOVE BY GASTRIC LAVAGE. AVOID ASPIRATION.

FURTHER TREATMENT - CONTROL EXCITEMENT OR CONVULSIONS WITH DIAZEPAM, 0.1 MG/KG, SLOWLY INTRAVENOUSLY. KEEP PATIENT AT REST UNTIL RESPIRATION IS NORMAL. DO NOT GIVE EPINEPHRINE OR EPHEDRINE OR RELATED DRUGS. MONITOR ECG FOR VENTRICULAR ABNORMALITIES INDICATING CARDIAC ARREST.

SPECIAL TREATMENT - TREAT ANEMIA WITH REPEATED BLOOD TRANSFUSIONS. TREAT KIDNEY OR LIVER DAMAGE.

(MEDICATION MUST BE GIVEN BY QUALIFIED MEDICAL PERSONNEL)

(DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

GASTRIC LAVAGE - GIVE PATIENT GLASS OF WATER PRIOR TO PASSING OF STOMACH TUBE. LAY PATIENT ON ONE SIDE, WITH HEAD LOWER THAN WAIST. IMMOBILIZE A STRUGGLING PATIENT WITH A SHEET OR BLANKET. MEASURE DISTANCE ON TUBE FROM MOUTH TO EPIGASTRIUM, MARK TUBE WITH INDELIBLE MARKING OR TAPE. REMOVE DENTURES AND OTHER FOREIGN OBJECTS FROM MOUTH. OPEN MOUTH, USE GAG IF NECESSARY. EXTEND HEAD BY LIFTING THE CHIN. PASS TUBE OVER TONGUE AND TOWARD BACK OF THROAT WITHOUT EXTENDING HEAD OR NECK. IF OBSTRUCTION IS MET BEFORE THE MARK ON TUBE REACHES LEVELS OF TEETH, DO NOT FORCE, BUT REMOVE TUBE AND REPEAT PROCEDURE UNTIL TUBE PASSES TO MARK. PLACE END OF TUBE IN GLASS OF WATER. IF TUBE IS OBSTRUCTED WHEN INTRODUCED ABOUT HALFWAY TO THE MARK, IT MAY HAVE ENTERED TRACHEA.

AFTER TUBE IS PLACED IN STOMACH, ASPIRATE FIRST TO REMOVE STOMACH CONTENTS BY IRRIGATION SYRINGE. SAVE STOMACH CONTENTS FOR EXAMINATION, AND REPEAT INTRODUCTION AND WITHDRAWAL OF 100-300 ML WARM WATER UNTIL AT LEAST 3 LITERS OF CLEAR RETURN ARE OBTAINED. USE ACTIVATED CHARCOAL AT BEGINNING OF LAVAGE TO AID IN POISON INACTIVATION. LEAVE 50 GRAMS OF CHARCOAL SUSPENDED IN WATER IN THE STOMACH. IF INTRODUCTION AND REMOVAL OF LAVAGE FLUID BY GRAVITY REQUIRES MORE THAN FIVE MINUTES, ASSIST WITH ASEPTO SYRINGE. PREVENT ASPIRATION WITH CUFFED ENDOTRACHEAL TUBE. AVOID GIVING LARGE QUANTITIES OF WATER.

MASSAGE OF EPIGASTRIUM WHILE STOMACH TUBE IS BEING ASPIRATED MAY AID IN POISON REMOVAL.

IF PATIENT COMATOSE, INTUBATE TRACHEA WITH CUFFED ENDOTRACHEAL TUBE. SUCCINYLCHLORINE MAY BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL TO EASE INSERTION OF TRACHEAL CATHETER PRIOR TO PASSAGE OF STOMACH TUBE.

(DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

CONVULSIONS - GIVE ARTIFICIAL RESPIRATION BY MOUTH-TO-MOUTH INSUFFLATION. RESTRAIN THE PATIENT DURING CONVULSIONS TO PREVENT INJURY. DO NOT ATTEMPT EMESIS OR GASTRIC LAVAGE WHILE THE PATIENT IS TWITCHING OR HYPERIRRITABLE UNLESS THE AIRWAY IS CONTROLLED AND REMOVAL OF DRUG IS IMPERATIVE.

ADMINISTER ANTICONVULSANTS. MAINTAIN HYDRATION BY ORAL OR INTRAVENOUS FLUID ADMINISTRATION. MAINTAIN AN ADEQUATE AIRWAY. TREAT HYPOGLYCEMIA BY GIVING GLUCOSE. REDUCE ELEVATED TEMPERATURE BY USING TEPID SPONGES. REMOVE SECRETIONS FROM THE PHARYNX BY SUCTION. GIVE POSITIVE-PRESSURE RESPIRATION WITH OXYGEN DURING CONVULSIONS.

(DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

ACUTE RENAL FAILURE - TREAT SHOCK. FOR HEMOLYTIC REACTIONS, GIVE SODIUM BICARONATE, 5 G EVERY 1-2 HOURS AS NECESSARY TO MAINTAIN AN ALKALINE URINE.

(MEDICATION MUST BE GIVEN BY QUALIFIED MEDICAL PERSONNEL)

(DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

LIVER DAMAGE - REMOVE FROM EXPOSURE TO ALL CHEMICALS AND DRUGS. MAINTAIN COMPLETE BED REST. AVOID ANESTHESIA OR SURGICAL PROCEDURES. AVOID DEHYDRATION OR OVERHYDRATION. IF VOMITING SEVERE AND ORAL FLUIDS NOT RETAINED, REPLACE VOMITUS WITH AN EQUAL QUANTITY OF 100% DEXTROSE IN NORMAL SALINE. IN RENAL FUNCTION ADEQUATE, GIVE 1 LITER OF 5% DEXTROSE OR INVERT SUGAR IN NORMAL SALINE PLUS 1-3 LITERS OF 10% DEXTROSE OR INVERT SUGAR IN DISTILLED WATER INTRAVENOUSLY EVERY TWENTY-FOUR HOURS.

(DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

ORGANS

BLOOD

CENTRAL NERVOUS SYSTEM

SKIN

BONE MARROW

EYES

RESPIRATORY SYSTEM

STATUS OF REGULATORY ENFORCEMENT

OSHA STANDARD 29CFR1910.1200 HAZARD COMMUNICATION

REQUIRES CHEMICAL MANUFACTURERS AND IMPORTERS TO ASSESS THE HAZARDS OF CHEMICALS WHICH THEY PRODUCE OR IMPORT, AND ALL EMPLOYERS HAVING WORKPLACES IN THE MANUFACTURING DIVISION, STANDARD INDUSTRIAL CLASSIFICATION CODES 20 THROUGH 39, TO PROVIDE INFORMATION TO THEIR EMPLOYEES CONCERNING HAZARDOUS CHEMICALS BY MEANS OF HAZARD COMMUNICATION PROGRAMS INCLUDING LABELS, MATERIAL SAFETY DATA SHEETS, TRAINING, AND ACCESS TO WRITTEN RECORDS

48FR53280 11/25/83

FOLLOWING OSHA STANDARDS APPLICABLE TO SUBSTANCES LISTED 29CFR1910, OTHERWISE ADVISE:

OSHA STANDARD 29CFR1910.1000 AIR CONTAMINANTS

TABLE Z-2

OSHA STANDARD 29CFR1910.94 VENTILATION

OSHA STANDARD 29CFR1910.134 RESPIRATORY PROTECTION

OSHA STANDARD 29CFR1910.20 ACCESS TO EMPLOYEE EXPOSURE AND MEDICAL RECORDS

OSHA STANDARD 29CFR1910.132 PERSONAL PROTECTIVE EQUIPMENT

OSHA STANDARD 29CFR1910.141 SANITATION

OSHA STANDARD 29CFR1910.151 MEDICAL SERVICES AND FIRST AID

OSHA STANDARD 29CFR1910.133 EYE AND FACE PROTECTION

40CFR717 RECORDS AND REPORTS OF ALLEGATIONS THAT CHEMICAL SUBSTANCES CAUSE SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT

REQUIRES MANUFACTURERS AND CERTAIN PROCESSORS OF CHEMICAL SUBSTANCES AND MIXTURES TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT ALLEGED TO HAVE BEEN CAUSED BY A SUBSTANCE OR MIXTURE. EPA MAY INSPECT AND REQUIRE REPORTING OF SUCH RECORDS.

48FR38178 08/22/83

OSHA STANDARD 29CFR1910.106 FLAMMABLE AND COMBUSTIBLE LIQUIDS

APPLIES TO THE HANDLING, STORAGE, AND USE OF FLAMMABLE AND COMBUSTIBLE LIQUIDS WITH A FLASH POINT BELOW 200 F

SUBSTANCE ESTABLISHED AS CONFIRMED OR SUSPECTED CARCINOGEN (POTENTIAL CARCINOGEN) BY THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC)

SUBSTANCE LISTED AS 'KNOWN TO BE CARCINOGENIC' OR 'MAY REASONABLY BE ANTICIPATED TO BE CARCINOGENIC' IN NATIONAL TOXICOLOGY PROGRAM (NTP) THIRD ANNUAL REPORT ON CARCINOGENS

SUBSTANCE LISTED AS TOXIC POLLUTANT UNDER CLEAN WATER ACT (CWA) SECTION 307(A)

40CFR116 DESIGNATION OF HAZARDOUS SUBSTANCES

DESIGNATED AS HAZARDOUS SUBSTANCE IN ACCORDANCE WITH SECTION 311(B)(2)(A) OF THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED. INCLUDES ANY ISOMERS AND HYDRATES, AS WELL AS ANY SOLUTIONS AND MIXTURES CONTAINING THIS SUBSTANCE.

43FR10747 03/13/78

43FR27533 06/26/78

44FR10266 02/16/79 (AMENDMENT)

44FR10268 02/16/79 (AMENDMENT)

44FR65400 11/13/79 (AMENDMENT)

44FR66602 11/20/79 (AMENDMENT)

40CFR261.33(F) DISCARDED COMMERCIAL CHEMICAL PRODUCTS, OFF-SPECIFICATION SPECIES, CONTAINERS, AND SPILL RESIDUES THEREOF
COMMERCIAL CHEMICAL PRODUCT OR MANUFACTURING CHEMICAL INTERMEDIATE IDENTIFIED AS TOXIC WASTE UNLESS OTHERWISE DESIGNATED.
45FR33084 05/19/80

49CFR172.101 TABLES OF HAZARDOUS MATERIALS, THEIR DESCRIPTION, PROPER SHIPPING NAME, CLASS, LABEL, PACKAGING, AND OTHER REQUIREMENTS

DESIGNATED IN HAZARDOUS MATERIALS TABLE AS HAZARDOUS MATERIAL FOR THE PURPOSE OF TRANSPORTATION.

41FR15996 04/15/76

45FR34588 05/22/80 (AMENDMENT)

45FR46420 07/10/80 (AMENDMENT)

45FR62080 09/18/80 (AMENDMENT)

45FR74649 11/10/80 (AMENDMENT)

46FR17739 03/19/81 (AMENDMENT)

46FR19235 03/30/81 (AMENDMENT)

49CFR172.102 TABLES OF HAZARDOUS MATERIALS, THEIR DESCRIPTION, PROPER SHIPPING NAME, CLASS, LABEL, PACKAGING, AND OTHER REQUIREMENTS

DESIGNATED IN OPTIONAL HAZARDOUS MATERIALS TABLE WITH ALTERNATIVES TO CORRESPONDING REQUIREMENTS IN 49CFR172.101 FOR INTERNATIONAL SHIPMENTS AS AUTHORIZED BY 49CFR171.12

41FR15996 04/15/76

46FR29393 06/01/81 (AMENDMENT)

46FR32250 06/22/81 (AMENDMENT)

40CFR61 - NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS
SUBPART J - NATIONAL EMISSION STANDARD FOR EQUIPMENT LEAKS (FUGITIVE
EMISSION SOURCES) OF BENZENE

APPLIES TO EACH OF THE FOLLOWING SOURCES THAT ARE INTENDED TO OPERATE
IN BENZENE SERVICES: PUMPS, COMPRESSORS, PRESSURE RELIEF DEVICES,
SAMPLING CONNECTIONS, SYSTEMS, OPEN-ENDED VALVES OR LINES, VALVES,
FLANGES AND OTHER CONNECTORS, PRODUCT ACCUMULATOR VESSELS, AND CONTROL
DEVICES OR SYSTEMS REQUIRED BY THIS SUBPART.

THE PROVISIONS OF THIS SUBPART DO NOT APPLY TO SOURCES LOCATED IN COKE
BYPRODUCT PLANTS.
49FR23498 06/06/84

SUBSTANCE LISTED AS A HAZARDOUS AIR POLLUTANT UNDER CLEAN AIR ACT (CAA)
SECTION 112

THIS SUBSTANCE TESTED FOR PHARMACOKINETICS/METABOLISM
BY THE CENTERS FOR DISEASE CONTROL/NATIONAL INSTITUTE FOR
OCCUPATIONAL SAFETY AND HEALTH (CDC)

SUBSTANCE SUBJECT TO REQUIREMENTS OF GENERAL INDUSTRY SAFETY ORDER
(GISO) 5194 OR TITLE 8 OF CALIFORNIA ADMINISTRATIVE CODE AND DIVISION 5,
CHAPTER 2.5 OF CALIFORNIA LABOR CODE

SUBSTANCE LISTED HAZARDOUS
STATE OF CALIFORNIA ADMINISTRATIVE CODE
TITLE 22. SOCIAL SECURITY
DIVISION 4. ENVIRONMENTAL HEALTH
CHAPTER 30. MINIMUM STANDARDS FOR MANAGEMENT OF HAZARDOUS AND
EXTREMELY HAZARDOUS WASTES

TOXIC SUBSTANCE CONTROL ACT (TSCA) SECTION 8(E) INITIAL
EVALUATION OF SUBSTANTIAL RISK SUBMITTED TO EPA, 1982

SUBSTANCE LISTED RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)
40CFR261.32 EPA HAZARDOUS WASTE NO. K025: DISTILLATION BOTTOMS
FROM THE PRODUCTION OF NITROBENZENE BY THE NITRATION OF BENZENE.
(T)

COMMENT REVIEW COMPLETED/PUBLISHED CLEAN AIR ACT (CAA)

REGULATION PROMULGATED CLEAN WATER ACT (CWA) SECTION 311
40CFR117

REGULATION IN DEVELOPMENT/PROGRESS COMPREHENSIVE ENVIRONMENTAL
RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA) SECTION 101

TECHNICAL ASSISTANCE DATA COMPLETED/PUBLISHED FEDERAL
INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT (FIFRA)

TECHNICAL ASSISTANCE DATA COMPLETED/PUBLISHED CLEAN WATER ACT
(CWA) SECTION 311
RISK DOCUMENTATION/ASSESSMENT IN DEVELOPMENT/PROGRESS CLEAN AIR
ACT (CAA)

MONITORING/LEVELS MEASUREMENT COMPLETED/PUBLISHED CLEAN WATER ACT (CWA)

CRITERIA DOCUMENT IN DEVELOPMENT/PROGRESS SAFE DRINKING WATER ACT (SDWA)

OSHA STANDARD 29CFR1910.1002 COAL TAR PITCH VOLATILES

REGULATION COMPLETED/PUBLISHED FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT (FIFRA) SECTION 6

MATERIALS BALANCE STUDY COMPLETED/PUBLISHED TOXIC SUBSTANCES CONTROL ACT (TSCA)

REGULATION PROMULGATED RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) 40CFR260

REBUTTABLE PRESUMPTION AGAINST REGISTRATION (RPAR) OR ADVANCED NOTICE OF PROPOSED RULEMAKING (ANPR) COMPLETED/PUBLISHED FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT (FIFRA) SECTION 6

PREREGULATORY ASSESSMENT COMPLETED/PUBLISHED TOXIC SUBSTANCES CONTROL ACT (TSCA)

40CFR122, APPENDIX D - NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT APPLICATION TESTING REQUIREMENTS
TABLE II - ORGANIC TOXIC POLLUTANTS IN EACH OF FOUR FRACTIONS IN ANALYSIS BY GAS CHROMATOGRAPHY/MASS SPECTROSCOPY (GS/MS)
48FR14153 04/01/83

16CFR1500.14 PRODUCTS REQUIRING SPECIAL LABELING UNDER SECTION 3(B) OF THE FEDERAL HAZARDOUS SUBSTANCES ACT
38FR27012 09/27/73
41FR22934 06/08/76
48FR16 01/03/83

THIS SUBSTANCE TESTED FOR CARCINOGENESIS BY THE NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES (NIEHS)

SUBSTANCE LISTED RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) 40CFR261.32 EPA HAZARDOUS WASTE NO. K085: DISTILLATION OR FRACTIONATION COLUMN BOTTOMS FROM THE PRODUCTION OF CHLOROBENZENES. (T)

SUBSTANCE LISTED RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)
 40CFR261.31 EPA HAZARDOUS WASTE NO. F024: WASTES, INCLUDING BUT NOT
 LIMITED TO, DISTILLATION RESIDUES, HEAVY ENDS, TARS, AND REACTOR
 CLEANOUT WASTES FROM THE PRODUCTION OF CHLORINATED ALIPHATIC HYDRO-
 CARBONS, HAVING CARBON CONTENT FROM ONE TO FIVE, UTILIZING FREE RADICAL
 CATALYZED PROCESSES. (THIS LIST DOES NOT INCLUDE LIGHT ENDS, SPENT
 FILTERS AND FILTER AIDS, SPENT DESSICANTS, WASTEWATER, WASTEWATER TREAT-
 MENT SLUDGES, SPENT CATALYSTS, AND WASTES LISTED IN 40CFR261.32)
 49FR5308 02/10/84

SUBSTANCE LISTED TOXIC SUBSTANCES CONTROL ACT INVENTORY

PREPACKAGED LIQUID SOLVENTS FOR PAINTS OR OTHER SIMILAR
 SURFACE-COATING MATERIALS THAT CONTAIN 10% OR MORE BY
 WEIGHT OF BENZENE, TOLUENE, XYLENE, PETROLEUM DISTALLATES,
 OR COMBINATIONS THEREOF, AND THAT HAVE A VISCOSITY OF LESS
 THAN 100 SAYBOLT UNIVERSAL SECONDS AT 100 F, REQUIRE SPECIAL
 PACKAGING TO PROTECT CHILDREN FROM SERIOUS PERSONAL INJURY
 OR SERIOUS ILLNESS RESULTING FROM HANDLING, USE, OR INGESTION.

16CFR1700.14

PRODUCTS CONTAINING 5% OR MORE BY WEIGHT OF BENZENE REQUIRE
 SPECIAL PACKAGING TO PROTECT CHILDREN FROM SERIOUS PERSONAL
 INJURY OR SERIOUS ILLNESS RESULTING FORM HANDLING, USE, OR
 INGESTION. 16CFR1700.14

MEDICAL SURVEILLANCE REQUIRED

GENERAL MEDICAL HISTORY

40CFR717 RECORDS AND REPORTS OF ALLEGATIONS THAT CHEMICAL SUBSTANCES
 CAUSE SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT

TOXIC SUBSTANCES CONTROL ACT (TSCA) SECTION 8(C) RULE REQUIRES
 MANUFACTURERS AND CERTAIN PROCESSORS OF CHEMICAL SUBSTANCES AND MIXTURES
 TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO EMPLOYEE HEALTH FOR
 30 YEARS

48FR38187 08/22/83

48FR39225 08/30/83 (EFFECTIVE DATE CORRECTION)

RESPIRATORY HISTORY

BLOOD DISEASE

DIFFERENTIAL BLOOD CELL MORPHOLOGY

COMPLETE BLOOD COUNT

INDICES

PHYSICIAN EXAMINATION

INDUSTRIAL EXPOSURE HISTORY

14 BY 17 CHEST P.A. X-RAY

VISION TEST

PULMONARY FUNCTIONS

URINALYSIS

RETICULOCYTE COUNT

PLATELET COUNT

SKIN EXAM

ATTENTION TO SMOKING, ALCOHOL, MEDICATION, AND EXPOSURE TO CARCINOGENS

CERTIFICATIONS

HEALTH STATUS CLASSIFICATION

NUCLEAR REG. 0041

OSHA RESPIRATOR CERTIFICATION 29CFR1910.134

DEPARTMENT OF TRANSPORTATION IF OPERATES HEAVY EQUIPMENT

EMPLOYEE HAZARDOUS MATERIALS EDUCATION RECEIPT

EMPLOYEE MEDICAL RECORDS RECEIPT

TOXIC SUBSTANCES CONTROL ACT (TSCA) SECTION 8(C) RULE
REQUIRES MANUFACTURERS AND CERTAIN PROCESSORS OF CHEMICAL
SUBSTANCES AND MIXTURES TO KEEP RECORDS OF SIGNIFICANT
ADVERSE REACTIONS TO EMPLOYEE HEALTH FOR 30 YEARS.
CONTACT: JACK P. MCCARTHY, OFFICE OF TOXIC SUBSTANCES,
EPA (800)424-1404. 48FR38178 8/22/83

MEDICAL WARNING REQUIRED FOR MEDICAL EXAM REFUSAL SIGNED
BY EMPLOYEE

SPECIAL DIAGNOSTIC TESTS

URINE PHENOL BEFORE WORK SHIFT ENDS, LIMIT LIQUID
INTAKE

URINE PHENOL

MORPHOLOGICAL BLOOD SLIDE

COMPLETE BLOOD COUNT

DIFFERENTIAL WHITE BLOOD CELL COUNT

LEAKS AND SPILL PROCEDURES

A REPORTABLE QUANTITY OF ONE THOUSAND POUNDS APPLIES TO THIS SUBSTANCE
ESTABLISHED BY SECTIONS 101(14) AND 102(B) OR ADJUSTED UNDER SECTION
102(A) OF THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND
LIABILITY ACT OF 1980 (CERCLA). SECTIONS 103(A) AND 103(B) REQUIRE THAT
PERSONS IN CHARGE OF A VESSEL OR FACILITY FROM WHICH A HAZARDOUS
SUBSTANCE HAS BEEN RELEASED IN A QUANTITY EQUAL TO OR GREATER THAN THE
REPORTABLE QUANTITY FOR THAT SUBSTANCE IMMEDIATELY NOTIFY THE NATIONAL
RESPONSE CENTER (800) 424-8802; IN THE WASHINGTON, D.C. METROPOLITAN
AREA (202) 426-2675
50FR13456 04/04/85

DEPARTMENT OF TRANSPORTATION HAZARD CLASS
49CFR172.101 HAZARDOUS MATERIALS TABLE

FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS
 49CFR172.101 (SUBJECT TO ADDITIONAL LABELING REQUIREMENTS OF
 49CFR172.402)

FLAMMABLE LIQUID

INTERGOVERNMENTAL MARITIME ORGANIZATION HAZARD CLASS
 49CFR172.102 OPTIONAL HAZARDOUS MATERIALS TABLE

CLASS 3.2-INFLAMMABLE LIQUIDS

INTERGOVERNMENTAL MARITIME ORGANIZATION LABELING SPECIFICATIONS FOR
 DOMESTIC AND EXPORT SHIPMENTS
 49CFR172.102

FLAMMABLE LIQUID

FOLLOWING INFORMATION FROM BUREAU OF EXPLOSIVES "EMERGENCY HANDLING OF
 HAZARDOUS MATERIALS":

IF MATERIAL ON FIRE OR INVOLVED IN FIRE:

- * DO NOT EXTINGUISH FIRE UNLESS FLOW CAN BE STOPPED
- * USE WATER IN FLOODING QUANTITIES AS FOG
- * SOLID STREAM OF WATER MAY SPREAD FIRE
- * COOL ALL AFFECTED CONTAINERS WITH FLOODING QUANTITIES OF WATER
- * APPLY WATER FROM AS FAR A DISTANCE AS POSSIBLE
- * USE ALCOHOL FOAM OR CO2 OR DRY CHEMICAL EXTINGUISHERS

IF MATERIAL IS NOT ON FIRE AND IS NOT INVOLVED IN FIRE:

- * KEEP SPARKS, FLAMES AND OTHER IGNITION SOURCES AWAY
- * KEEP MATERIAL OUT OF WATER SOURCES AND SEWERS
- * BUILD DIKES TO CONTAIN FLOW AS NECESSARY
- * USE WATER SPRAY TO KNOCK DOWN VAPORS

PERSONNEL PROTECTION:

- * AVOID BREATHING DUST/VAPORS/FUMES FROM MATERIAL
- * KEEP UPWIND
- * WEAR BOOTS, PROTECTIVE GLOVES AND GAS TIGHT GOGGLES
- * DO NOT HANDLE BROKEN PACKAGES WITHOUT PROTECTIVE EQUIPMENT
- * WASH AWAY ANY MATERIALS WHICH MAY HAVE CONTACTED THE BODY WITH
 COPIOUS AMOUNTS OF WATER OR SOAP AND WATER

EVACUATION PROCEDURE:

- * IF FIRE UNCONTROLLABLE OR CONTAINER EXPOSED TO DIRECT FLAME, EVACUATE
 FOR A RADIUS OF 1500 FEET
- * IF MATERIAL LEAKING (NOT ON FIRE), DOWNWIND EVACUATION MUST BE
 CONSIDERED

LAND SPILL:

- * DIG A PIT, POND, LAGOON OR HOLDING AREA TO CONTAIN LIQUID OR SOLID MATERIAL
- * DIKE SURFACE FLOW USING SOIL, SANDBAGS, FOAMED POLYURETHANE OR FOAMED CONCRETE
- * ABSORB BULK LIQUID WITH FLY ASH OR CEMENT POWDER
- * APPLY FLUOROCARBON WATER FOAM TO DIMINISH VAPOR AND FIRE HAZARD

WATER SPILL:

- * USE NATURAL BARRIERS OR OIL SPILL CONTROL BOOMS TO LIMIT SPILL MOTION
- * USE SURFACE ACTIVE AGENT, DETERGENTS, SOAPS, ALCOHOLS TO COMPRESS AND THICKEN SPILLED MATERIAL
- * INJECT UNIVERSAL GELLING AGENT TO SOLIDIFY ENCIRCLED SPILL AND INCREASE EFFECTIVENESS OF BOOMS
- * IF DISSOLVED, APPLY ACTIVATED CARBON AT 10 TIMES SPILLED AMOUNT AT 10PPM OR GREATER CONCENTRATION
- * REMOVE TRAPPED MATERIAL WITH SUCTION HOSES
- * USE MECHANICAL DREDGES OR LIFTS TO REMOVE IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES

AIR SPILL:

- * APPLY WATER SPRAY TO KNOCK DOWN VAPORS

FOLLOWING INFORMATION FROM DEPARTMENT OF TRANSPORTATION/U.S. COAST GUARD "CHEMICAL RESPONSE INFORMATION SYSTEM", REGARDING WATER SPILLS:

- * RESTRICT ACCESS OF GENERAL PUBLIC WHEN APPRECIABLE DANGER ARISES FROM SPILL
- * RESTRICT IGNITION SOURCES WHEN SUBSTANCE INVOLVED
- * RESTRICT HUMAN USE WHEN SUBSTANCE INVOLVED
- * RESTRICT INDUSTRIAL USE WHEN SPILLED SUBSTANCE COULD CORRODE MACHINERY OR IF POSSIBILITY OF IGNITION FROM HIGHLY FLAMMABLE VAPORS DEVELOPS
- * CONTAIN SURFACE SLICKS
- * SKIM SURFACE SLICK
- * HIGHLY VOLATILE, AVOID INHALATION, VAPORS OR DUST ARE IRRITATING OR TOXIC
- * HIGHLY CORROSIVE, AVOID DIRECT CONTACT, CONTACT WITH SKIN OR EYES CAN CAUSE IRRITATION OR BURNS
- * BURNING MAY BE PROHIBITED BY ANTI-POLLUTION LAWS AND REGULATIONS
- * SUBSTANCE HAS SOOTY BURNING
- * SUBSTANCE FLOATS ON WATER

LISTED BY U.S. COAST GUARD UNDER CARGO COMPATIBILITY GROUP AROMATIC HYDROCARBONS, INCOMPATIBLE WITH NITRIC ACID

- * U.S. COAST GUARD REQUIRES 24 HOUR ADVANCE NOTICE TO CAPTAIN OF THE PORT WHEN THIS SUBSTANCE IS SCHEDULED TO ARRIVE AT PORT WHEN TRANSPORTED IN BULK QUANTITY

WASTE

THIS MATERIAL LISTED AS HAZARDOUS SUBSTANCE, AS DEFINED IN SECTION 101(14) OF THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSTATION, AND LIABILITY ACT (CERCLA) OF 1980, PURSUANT TO ONE OR MORE OF THE FOLLOWING:

- * FEDERAL WATER POLLUTION CONTROL ACT (FWPCA) SECTION 311(B)(2)(A)
- * SOLID WASTE DISPOSAL ACT SECTION 3001
- * CLEAN WATER ACT (CWA) SECTION 307(A)
- * CLEAN AIR ACT (CAA) SECTION 112
- * TOXIC SUBSTANCES CONTROL ACT (TSCA) SECTION 7
- * COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA) SECTION 102

EPA HAZARDOUS WASTE NUMBER U019
BENZENE (I,T)

40CFR260 HAZARDOUS WASTE MANAGEMENT SYSTEM: GENERAL

PROVIDES DEFINITIONS OF TERMS, GENERAL STANDARDS, AND OVERVIEW INFORMATION APPLICABLE TO 40CFR PARTS 260-265

40CFR261 IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

IDENTIFIES THOSE SOLID WASTES WHICH ARE SUBJECT TO REGULATION AS HAZARDOUS WASTES UNDER 40CFR PARTS 262-265, 270, 271, AND 124 AND WHICH ARE SUBJECT TO THE NOTIFICATION REQUIREMENTS OF SECTION 3010 OF THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) AND IDENTIFIES ONLY SOME OF THE MATERIALS WHICH ARE HAZARDOUS WASTES UNDER SECTIONS 3007 AND 7003 OF RCRA

40CFR262 STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE
ESTABLISHES STANDARDS FOR GENERATORS OF HAZARDOUS WASTE

40CFR263 STANDARDS APPLICABLE TO TRANSPORTERS OF HAZARDOUS WASTE

ESTABLISHES STANDARDS WHICH APPLY TO PERSONS TRANSPORTING HAZARDOUS WASTE WITHIN THE UNITED STATES IF THE TRANSPORTATION REQUIRES A MANIFEST UNDER 40CFR262

40CFR264 STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE
TREATMENT, STORAGE, AND DISPOSAL FACILITIES

ESTABLISHES MINIMUM NATIONAL STANDARDS WHICH DEFINE THE ACCEPTABLE MANAGEMENT OF HAZARDOUS WASTE

40CFR265 INTERIM STATUS STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

ESTABLISHES MINIMUM NATIONAL STANDARDS WHICH DEFINE THE ACCEPTABLE MANAGEMENT OF HAZARDOUS WASTE DURING THE PERIOD OF INTERIM STATUS

40CFR267 INTERIM STANDARDS FOR OWNERS AND OPERATORS OF NEW HAZARDOUS WASTE LAND DISPOSAL FACILITIES

ESTABLISHES MINIMUM NATIONAL STANDARDS THAT DEFINE THE ACCEPTABLE MANAGEMENT OF HAZARDOUS WASTE FOR NEW LAND DISPOSAL FACILITIES

40CFR270 EPA ADMINISTERED PERMIT PROGRAMS: THE HAZARDOUS WASTE PERMIT PROGRAM

ESTABLISHES PROVISIONS FOR THE HAZARDOUS WASTE PERMIT PROGRAM UNDER SUBTITLE C OF THE SOLID WASTE DISPOSAL ACT, AS AMENDED BY THE RESOURCE CONSERVATION AND RECOVERY ACT

40CFR271 REQUIREMENT FOR AUTHORIZATION OF STATE HAZARDOUS WASTE PROGRAMS

SPECIFIES THE PROCEDURES EPA WILL FOLLOW IN APPROVING, REVISING, AND WITHDRAWING APPROVAL OF STATE PROGRAMS AND THE REQUIREMENTS STATE PROGRAMS MUST MEET TO BE APPROVED BY THE ADMINISTRATION UNDER SECTION 3006(B) OF RCRA

CAS NUMBER
71-43-2

REGISTRY TOXIC CHEMICALS NUMBER
CY1400000

BULLETINS

SPECIAL INFORMATION

BENZENE MAY EXIST AT MUCH HIGHER CONCENTRATIONS IN VAPORS THAN IN BENZENE-CONTAINING LIQUIDS.

Material Safety Data Sheet
May be used to comply with
OSHA's Hazard Communication Standard,
29 CFR 1910.1200. Standard must be
consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072



IDENTITY (As Used on Label and List)

CITRANOX

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name

ALCONOX, INC.

Emergency Telephone Number

(212)473-1300

Address (Number, Street, City, State, and ZIP Code)

215 PARK AVENUE SOUTH

Telephone Number for Information

(212)473-1300

NEW YORK, NY 10003

Date Prepared

FEB. 1, 1991

Signature of Preparer (optional)

Section II — Hazardous Ingredients/Identity Information

| Hazardous Components (Specific Chemical Identity, Common Name(s)) | OSHA PEL | ACGIH TLV | Other Limits Recommended | % (optional) |
|---|----------|-----------|--------------------------|--------------|
|---|----------|-----------|--------------------------|--------------|

THERE ARE NO INGREDIENTS IN CITRANOX WHICH APPEARED ON THE OSHA STANDARD
29 CFR 1910 SUBPART Z.

Section III — Physical/Chemical Characteristics

| | | | |
|-------------------------|---------|---|---------|
| Boiling Point | 217°F | Specific Gravity (H ₂ O = 1) | 1.120 |
| Vapor Pressure (mm Hg.) | NO DATA | Melting Point | N.A. |
| Vapor Density (AIR = 1) | NO DATA | Evaporation Rate (Butyl Acetate = 1) | NO DATA |

Solubility in Water

COMPLETELY SOLUBLE IN ALL PROPORTIONS

Appearance and Odor

PALE LIQUID - NEARLY ODORLESS

Section IV — Fire and Explosion Hazard Data

| | | | | |
|---------------------------|-----------------|------------------|------|------|
| Flash Point (Method Used) | NONE (OPEN CUP) | Flammable Limits | LEL | UEL |
| | | | N.A. | N.A. |

Extinguishing Media

WATER SPRAY, DRY CHEMICAL, FOAM, CARBON DIOXIDE

Special Fire Fighting Procedures

FOR FIRES INVOLVING THIS MATERIAL DO NOT ENTER WITHOUT PROTECTIVE

EQUIPMENT AND SELF CONTAINED BREATHING APPARATUS.

Unusual Fire and Explosion Hazards

NONE

Section V — Reactivity Data

| | | | | |
|-----------|----------|----|---------------------|------|
| Stability | Unstable | | Conditions to Avoid | NONE |
| | Stable | XX | | |

Incompatibility (Materials to Avoid) NONE

Hazardous Decomposition or Byproducts SO_2 MAY BE RELEASED ON BURNING

| | | | | |
|--------------------------|----------------|----|---------------------|------|
| Hazardous Polymerization | May Occur | | Conditions to Avoid | NONE |
| | Will Not Occur | XX | | |

Section VI — Health Hazard Data

Route(s) of Entry: Inhalation? NO Skin? YES Ingestion? YES

Health Hazards (Acute and Chronic)
SKIN CONTACT MAY PROVE LOCALLY IRRITATING, INGESTION MAY CAUSE DISCOMFORT AND/OR DIARRHEA.

Carcinogenicity: NTP? NO IARC Monographs? NO OSHA Regulated? NO

Signs and Symptoms of Exposure
PROLONGED SKIN CONTACT MAY CAUSE DRYING AND/OR CHAPPING.

Medical Conditions
Generally Aggravated by Exposure NONE

Emergency and First Aid Procedures
EYES - FLUSH WITH PLENTY OF WATER FOR 15 MINUTES. SKIN-FLUSH WITH WATER.
INGESTION - DRINK LARGE QUANTITIES OF WATER. GET MEDICAL ATTENTION FOR DISCOMFORT.

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled
MATERIAL FOAMS PROFUSELY. RECOVER AS MUCH AS POSSIBLE WITH ABSORBENT MATERIAL AND RINSE REMAINDER TO SEWER, MATERIAL IS COMPLETELY BIODEGRADABLE.

Waste Disposal Method
SMALL QUANTITIES MAY BE DISPOSED OF IN SEWER. LARGE QUANTITIES SHOULD BE SOAKED UP WITH ABSORBENT MATERIAL AND DISPOSED OF ACCORDING TO LOCAL ORDINANCES.

Precautions to Be Taken in Handling and Storing
NON REQUIRED - VISCOSITY OF MATERIAL INCREASE AT VERY LOW TEMPERATURE.

Other Precautions
NO SPECIAL REQUIREMENTS OTHER THAN THE GOOD INDUSTRIAL HYGIENE AND SAFETY PRACTICES EMPLOYED WITH ANY INDUSTRIAL CHEMICAL.

Section VIII — Control Measures

Respiratory Protection (Specify Type)
NOT REQUIRED

| | | | | |
|-------------|----------------------|--------|---------|------|
| Ventilation | Local Exhaust | NORMAL | Special | N.A. |
| | Mechanical (General) | N.A. | Other | N.A. |

Protective Gloves RECOMMENDED Eye Protection RECOMMENDED

Other Protective Clothing or Equipment NOT REQUIRED

Work/Hygiene Practices NO SPECIAL PRACTICES REQUIRED.

NOT seen
SODIUM BICARB IS NOT IN DATABASE.

ENTER NAME, KEYWORD, SYMPTOM, STLA, NAMELIST, HELP, OR QUIT.
name

ENTER CHEMICAL NAME
diesel

DIESEL IS NOT IN DATABASE.

ENTER NAME, KEYWORD, SYMPTOM, STLA, NAMELIST, HELP, OR QUIT.
name

ENTER CHEMICAL NAME
diesel fuel

DIESEL FUEL IS A SYNONYM OF DIESEL FUEL NO. 1-D
TYPE WHAT INFORMATION YOU REQUIRE
ALL, EMER, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), HELP, OR NONE
all

CHEMICAL NAME
DIESEL FUEL NO. 1-D

CHEMICAL ABSTRACTS SERVICE REGISTRY NUMBER
68334-30-5

REGISTRY OF TOXIC EFFECTS OF CHEMICALS NUMBER
NONE

CHEMICAL FORMULA
VARIES, SEE SPECIAL

SYNONYMS
DIESEL FUEL
DIESEL OIL
DIESEL OIL, LIGHT
NO. 1-D FUEL OIL
FUEL OIL NO 1-D
NA 1993
PETROLEUM PRODUCTS, DIESEL OIL
PETROLEUM DIESEL OIL PRODUCTS
DIESEL OIL PETROLEUM PRODUCTS
FUELS, DIESEL
DIESEL OIL (PETROLEUM)
DIESEL TEST FUEL
OHS07090

PHYSICAL DESCRIPTION
YELLOW-BROWN OILY LIQUID
MILD PETROLEUM ODOR

CHEMICAL AND PHYSICAL PROPERTIES
MOLECULAR WEIGHT: VARIES
BOILING POINT AT 1 ATM, F: 380 TO 560 F
SOLUBILITY IN WATER, G/100 G WATER AT 20C: INSOLUBLE
FLASH POINT, CLOSED CUP, F (OR OPEN CUP IF OC): 100 F
VAPOR PRESSURE @ 20 C, MMHG: NA
MELTING POINT, F: -30 F

UPPER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: 6
LOWER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: 1.3
AUTOIGNITION TEMPERATURE: 350-625 F
SPECIFIC GRAVITY: 0.81 TO 0.85
ODOR THRESHOLD: 0.7 PPM

FIRE AND EXPLOSION

FIRE AND EXPLOSION HAZARDS

MODERATE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION AND FLASH BACK.

VAPOR-AIR MIXTURES ARE EXPLOSIVE ABOVE FLASH POINT.

FIREFIGHTING MEDIA

DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN. WITHDRAW IMMEDIATELY IN CASE OF RISING SOUND FROM VENTING SAFETY DEVICE OR ANY DISCOLORATION OF TANK DUE TO FIRE. ISOLATE FOR 1/2 MILE IN ALL DIRECTIONS IF TANK, RAIL CAR OR TANK TRUCK IS INVOLVED IN FIRE (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 27).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED; USE FLOODING AMOUNTS OF WATER AS A FOG, SOLID STREAMS MAY BE INEFFECTIVE. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING VAPORS, KEEP UPWIND.

INCOMPATIBILITIES

STRONG OXIDIZERS

HEAT

THERMAL DECOMPOSITION PRODUCTS ARE HAZARDOUS AND/OR TOXIC

PERMISSIBLE EXPOSURE LIMIT AND TOXICOLOGY

NONE ESTABLISHED

ODOR THRESHOLD 0.08 PPM

CERCLA HAZARD RATINGS - TOXICITY U - IGNITABILITY 2 - REACTIVITY 0 - PERSISTENCE 2

TOXICOLOGY: DIESEL FUEL NO. 1 IS A SKIN AND MUCOUS MEMBRANE IRRITANT AND A CENTRAL NERVOUS SYSTEM DEPRESSANT. DIRECT CONTACT MAY CAUSE BLISTERING AND OPEN SORES. POISONING MAY AFFECT THE KIDNEYS, LIVER, AND RESPIRATORY SYSTEM.

REPEATED APPLICATION TO MOUSE SKIN WITH UNREFINED PETROLEUM DISTILLATES CAUSED A LOW INCIDENCE OF SKIN TUMORS.

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONCENTRATION

NONE SPECIFIED

ROUTE OF ENTRY INTO BODY

INHALATION

SKIN OR EYE CONTACT

INGESTION

ORGANS AFFECTED BY THE SUBSTANCE

LUNGS

RESPIRATORY SYSTEM

MUCOUS MEMBRANES

SKIN

CENTRAL NERVOUS SYSTEM

EYES

SYMPTOMS

HEADACHE

DIARRHEA

VOMITING

ABDOMINAL CRAMPS

SKIN ERUPTION

PULMONARY IRRITATION

NERVOUSNESS

INCOORDINATION

NARCOSIS

PERIPHERAL NUMBNESS

PARESTHESIA

COMA

FIRST AID PROCEDURES

IF THIS CHEMICAL GETS INTO THE EYES, WASH THE EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

IF THIS CHEMICAL GETS ON THE SKIN, REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

IF THIS CHEMICAL HAS BEEN INHALED, REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

IF THIS CHEMICAL HAS BEEN SWALLOWED, DO NOT INDUCE VOMITING. GET MEDICAL ATTENTION IMMEDIATELY.

MEDICAL SURVEILLANCE

NO INFORMATION AVAILABLE FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES FOR CHEMICAL HAZARDS"; ADVISE:

EKG RECOMMENDED IF EMPLOYEE TO WEAR FULL-FACE RESPIRATOR

GENERAL MEDICAL HISTORY

40CFR717 RECORDS AND REPORTS OF ALLEGATIONS THAT CHEMICAL SUBSTANCES CAUSE SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT

TOXIC SUBSTANCES CONTROL ACT (TSCA) SECTION 8(C) RULE REQUIRES

MANUFACTURERS AND CERTAIN PROCESSORS OF CHEMICAL SUBSTANCES AND MIXTURES TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO EMPLOYEE HEALTH FOR 30 YEARS.

PHYSICIAN PRE-PLACEMENT AND ANNUAL EXAMS
MEDICAL WARNING FOR REFUSAL OF MEDICAL EXAMINATION
CENTRAL NERVOUS SYSTEM EXAMINATION
BLOOD CHEMISTRY
WHEN BENZENE PRESENT
29CFR1910.20 OSHA STANDARD
SUBPART C - GENERAL SAFETY AND HEALTH PROVISIONS
PROVIDES FOR EMPLOYEE, DESIGNATED REPRESENTATIVE, AND OSHA
ACCESS TO EMPLOYER-MAINTAINED EXPOSURE AND MEDICAL RECORDS
RELEVANT TO EMPLOYEES EXPOSED TO TOXIC SUBSTANCES AND HARMFUL
PHYSICAL AGENTS.
53FR38140 9/29/88 (AMENDED)

SPECIAL DIAGNOSTIC TESTS

IF SYMPTOMS OF CENTRAL NERVOUS SYSTEM OCCUR, OBTAIN BLOOD GLUCOSE AND
RECTAL TEMPERATURE. PERFORM COMPLETE NEUROLOGIC EXAMINATION AND ANY
OTHER SPECIFIC NEUROLOGIC TESTS AS APPLICABLE
CONVULSIONS - BLOOD ANALYSIS FOR GLUCOSE, CALCIUM, UREA NITROGEN AND
CARBON DIOXIDE

CERTIFICATIONS

NO FEDERAL AGENCY REQUIREMENT, BUT DUE TO HAZARDOUS NATURE OF
SUBSTANCE, ADVISE FOLLOWING:

HEALTH STATUS CLASSIFICATION

OSHA RESPIRATOR CERTIFICATION 29CFR1910.134

DEPARTMENT OF TRANSPORTATION IF OPERATES HEAVY EQUIPMENT

EMPLOYEE HAZARDOUS MATERIALS EDUCATION RECEIPT

EMPLOYEE MEDICAL RECORDS RECEIPT

TOXIC SUBSTANCES CONTROL ACT (TSCA) SECTION 8(C) RULE REQUIRES
MANUFACTURERS AND CERTAIN PROCESSORS OF CHEMICAL SUBSTANCES AND
MIXTURES TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO
EMPLOYEE HEALTH FOR 30 YEARS. CONTACT: CHARLES L. ELKINS, OFFICE OF
TOXIC SUBSTANCES, EPA (202) 382-3813.

MEDICAL WARNING REQUIRED FOR MEDICAL EXAM REFUSAL SIGNED
BY EMPLOYEE

PROTECTIVE CLOTHING AND EQUIPMENT

NO NIOSH/OSHA DATA; RECOMMEND
PREVENT REPEATED OR PROLONGED SKIN CONTACT
WEAR IMPERVIOUS CLOTHING
WEAR GLOVES
WEAR FACESHIELD (8 INCH MINIMUM)

PLACE CONTAMINATED CLOTHING IN CLOSED CONTAINERS FOR STORAGE UNTIL
LAUNDERED OR DISCARDED
IF CLOTHING IS TO BE LAUNDERED, INFORM PERSON PERFORMING OPERATION OF
CONTAMINANT'S HAZARDOUS PROPERTIES

EYE PROTECTION

NO STANDARD REQUIREMENT, BUT ADVISE EYE PROTECTION TO

- PREVENT REASONABLE PROBABILITY OF EYE CONTACT
WEAR FACE SHIELD OR VENTED GOGGLES
- WASHING CHEMICALS FROM THE SKIN
NO STANDARD REQUIREMENT, BUT ADVISE WASHING
PROMPTLY WHEN SKIN BECOMES CONTAMINATED AND AT END OF EACH WORK SHIFT
- ROUTINE CHANGING OF WORK CLOTHING
NO STANDARD REQUIREMENT, BUT ADVISE CHANGING
IF IT IS REASONABLY PROBABLE THAT CLOTHING IS CONTAMINATED
- LEAVE CLOTHING & EQUIPMENT FOR DECONTAMINATION & DISPOSAL

CLOTHING REMOVAL FOLLOWING ACCIDENTAL CONTAMINATION

- NO STANDARD REQUIREMENT, BUT ADVISE REMOVING
PROMPTLY IF IT IS NON-IMPERVIOUS AND CONTAMINATED

SPECIFIC EMERGENCY PROVISIONS

- NO NIOSH/OSHA DATA, ADVISE:
EYE-WASH FOUNTAIN WITHIN IMMEDIATE WORK AREA WHERE EMPLOYEES' EYES MAY
BE EXPOSED TO SUBSTANCE
- QUICK DRENCHING FACILITIES WITHIN IMMEDIATE WORK AREA WHERE EMPLOYEES
MAY BE EXPOSED TO SUBSTANCE

RESPIRATOR SELECTION

NO SPEC ADVISE

- CHEMICAL CARTRIDGE RESPIRATOR
WITH AN ORGANIC VAPOR CARTRIDGE

HIGH LEVELS

- GAS MASK
WITH AN ORGANIC VAPOR CANISTER
- SUPPLIED-AIR RESPIRATOR
- SELF-CONTAINED BREATHING APPARATUS

ESCAPE

- GAS MASK
WITH AN ORGANIC VAPOR CANISTER
- SELF-CONTAINED BREATHING APPARATUS

FIREFIGHTING

- SELF-CONTAINED BREATHING APPARATUS
WITH A FULL FACE-PIECE
OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE

STATUS OF REGULATORY ENFORCEMENT

- 29CFR1910.1200 OSHA HAZARD COMMUNICATION STANDARD
REQUIRES CHEMICAL MANUFACTURERS AND IMPORTERS TO ASSESS THE HAZARDS OF
CHEMICALS WHICH THEY PRODUCE OR IMPORT, AND ALL EMPLOYERS TO PROVIDE
INFORMATION TO THEIR EMPLOYEES CONCERNING HAZARDOUS CHEMICALS BY MEANS
OF A HAZARD COMMUNICATION PROGRAM, LABELS AND OTHER FORMS OF WARNING,
MATERIAL SAFETY DATA SHEETS, AND INFORMATION AND TRAINING. REQUIRES

DISTRIBUTORS TO TRANSMIT REQUIRED INFORMATION TO EMPLOYEES.

OSHA STANDARD 29CFR1910.20 ACCESS TO EMPLOYEE EXPOSURE AND MEDICAL RECORDS

OSHA STANDARD 29CFR1910.132 PERSONAL PROTECTIVE EQUIPMENT

OSHA STANDARD 29CFR1910.141 SANITATION

OSHA STANDARD 29CFR1910.151 MEDICAL SERVICES AND FIRST AID

OSHA STANDARD 29CFR1910.133 EYE AND FACE PROTECTION

40CFR717 RECORDS AND REPORTS OF ALLEGATIONS THAT CHEMICAL SUBSTANCES CAUSE SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT

SECTION 8(C) OF THE TOXIC SUBSTANCES CONTROL ACT (TSCA) REQUIRES MANUFACTURERS, PROCESSORS, AND DISTRIBUTORS OF CHEMICAL SUBSTANCES AND MIXTURES TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT ALLEGED TO HAVE BEEN CAUSED BY THE SUBSTANCE OR MIXTURE. EPA MAY INSPECT AND REQUIRE REPORTING OF SUCH RECORDS.

49CFR172.101 TABLES OF HAZARDOUS MATERIALS, THEIR DESCRIPTION, PROPER SHIPPING NAME, CLASS, LABEL, PACKAGING, AND OTHER REQUIREMENTS

DESIGNATED IN HAZARDOUS MATERIALS TABLES AS HAZARDOUS MATERIAL FOR THE PURPOSE OF TRANSPORTATION.

INTERNATIONAL MARITIME ORGANIZATION (IMO) - DANGEROUS GOODS CODE
SUBSTANCE REGULATED BY N.O.S. CATEGORY FOR INTERNATIONAL SHIPMENTS

OSHA STANDARD 29CFR1910.94 VENTILATION

OSHA STANDARD 29CFR1910.134 RESPIRATORY PROTECTION

16CFR1500.14 PRODUCTS REQUIRING SPECIAL LABELING UNDER SECTION 3(B) OF THE FEDERAL HAZARDOUS SUBSTANCES ACT

40CFR370 SARA TITLE III SECTION 311 HAZARDOUS CHEMICAL REPORTING:
COMMUNITY RIGHT-TO-KNOW
SUBPART B - REPORTING REQUIREMENTS

40CFR370 SARA TITLE III SECTION 312 HAZARDOUS CHEMICAL REPORTING:
COMMUNITY RIGHT-TO-KNOW
SUBPART D - INVENTORY FORMS

29CFR1910.1450 SUBJECT TO OSHA STANDARD REGULATING OCCUPATIONAL EXPOSURE TO HAZARDOUS CHEMICALS IN LABORATORIES.

EFFECTIVE DATE: 5/1/90
55FR3300 1/31/90

46CFR30.25 COMMODITIES REGULATED BY THE COAST GUARD
SUBSTANCE LISTED UNDER FLAMMABLE AND COMBUSTIBLE BULK LIQUID CARGOES

40CFR268 LAND DISPOSAL RESTRICTIONS

TRANSPORTATION

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49-CFR 172.101:
COMBUSTIBLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49-CFR 172.101 AND
SUBPART E:
NONE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: NONE
EXCEPTIONS: 49-CFR 173.118A

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 09/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
DIESEL FUEL-NA 1993

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
3 - FLAMMABLE LIQUID

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG III

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
NONE

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.150
NON-BULK PACKAGING: 49 CFR 173.203
BULK PACKAGING: 49 CFR 173.241

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 60 L
CARGO AIRCRAFT ONLY: 220 L

LEAK AND SPILL PROCEDURES

A REPORTABLE QUANTITY OF ONE HUNDRED POUNDS APPLIES TO THIS SUBSTANCE
ADJUSTED UNDER SECTION 102(A) OF THE COMPREHENSIVE ENVIRONMENTAL
RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980 (CERCLA) BY EXHIBITING
ONE OR MORE OF THE CHARACTERISTICS OF IGNITABILITY, CORROSIVITY, OR
REACTIVITY IDENTIFIED IN 40CFR261.21 THROUGH 261.23. SECTIONS 103(A)
AND 103(B) REQUIRE THAT PERSONS IN CHARGE OF A VESSEL OR FACILITY FROM
WHICH A HAZARDOUS SUBSTANCE HAS BEEN RELEASED IN A QUANTITY EQUAL TO OR
GREATER THAN THE REPORTABLE QUANTITY FOR THAT SUBSTANCE IMMEDIATELY
NOTIFY THE NATIONAL RESPONSE CENTER (800) 424-8802; IN THE WASHINGTON,
D.C. METROPOLITAN AREA (202) 426-2675
50FR13456 04/04/85

FOLLOWING INFORMATION RECOMMENDED FOR THE EMERGENCY HANDLING OF
HAZARDOUS MATERIALS INVOLVED IN A LEAK OR SPILL INCIDENT:

IF MATERIAL ON FIRE OR INVOLVED IN FIRE:

- * EXTINGUISH FIRE ONLY IF FLOW CAN BE STOPPED
- * APPLY FLOODING QUANTITIES OF WATER AS FOG
- * SOLID STREAM OF WATER MAY SPREAD FIRE
- * USE FLOODING QUANTITIES OF WATER TO COOL ALL AFFECTED CONTAINERS
- * WATER SHOULD BE APPLIED FROM AS FAR A DISTANCE AS POSSIBLE
- * USE ALCOHOL FOAM OR CO2 OR DRY CHEMICAL EXTINGUISHERS

IF MATERIAL IS NOT ON FIRE AND IS NOT INVOLVED IN FIRE:

- * KEEP AWAY FROM SPARKS, FLAMES AND OTHER SOURCES OF IGNITION
- * DO NOT ALLOW MATERIAL TO CONTAMINATE WATER SOURCES AND SEWERS
- * CONTAIN FLOW WITH DIKES AS NECESSARY
- * CONTROL VAPORS WITH WATER SPRAY

PERSONNEL PROTECTION:

- * AVOID BREATHING DUST/VAPORS/FUMES FROM MATERIAL
- * KEEP UPWIND
- * AVOID SKIN CONTACT WITH MATERIAL
- * DO NOT HANDLE BROKEN PACKAGES WITHOUT PROTECTIVE EQUIPMENT
- * WASH CONTAMINATED SKIN WITH COPIOUS AMOUNTS OF WATER OR SOAP AND WATER
- * WEAR SELF-CONTAINED BREATHING APPARATUS WHEN FIGHTING FIRES INVOLVING THIS MATERIAL
- * IF CONTACT WITH MATERIAL ANTICIPATED, WEAR FULL PROTECTIVE CLOTHING

WASTE DISPOSAL

OBSERVE ALL FEDERAL, STATE OR LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. CONTACT LOCAL AND/OR STATE ENVIRONMENTAL AUTHORITIES TO INSURE PROPER COMPLIANCE.

40CFR261.21 CHARACTERISTIC OF IGNITABILITY
EPA HAZARDOUS WASTE NUMBER D001

THIS SUBSTANCE MEETS THE DEFINITION OF A HAZARDOUS WASTE AS DEFINED BY THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) (40CFR260) AND IS SUBJECT TO THE FOLLOWING CONSIDERATIONS:

40CFR260 HAZARDOUS WASTE MANAGEMENT SYSTEM: GENERAL

PROVIDES DEFINITIONS OF TERMS, GENERAL STANDARDS, AND OVERVIEW INFORMATION APPLICABLE TO 40CFR PARTS 260-265

40CFR261 IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

IDENTIFIES THOSE SOLID WASTES WHICH ARE SUBJECT TO REGULATION AS HAZARDOUS WASTES UNDER 40CFR PARTS 262-265, 270, 271, AND 124 AND WHICH ARE SUBJECT TO THE NOTIFICATION REQUIREMENTS OF SECTION 3010 OF THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) AND IDENTIFIES ONLY SOME OF THE MATERIALS WHICH ARE HAZARDOUS WASTES UNDER SECTIONS 3007 AND 7003 OF RCRA

40CFR262 STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE

ESTABLISHES STANDARDS FOR GENERATORS OF HAZARDOUS WASTE

40CFR263 STANDARDS APPLICABLE TO TRANSPORTERS OF HAZARDOUS WASTE

ESTABLISHES STANDARDS WHICH APPLY TO PERSONS TRANSPORTING HAZARDOUS WASTE WITHIN THE UNITED STATES IF THE TRANSPORTATION REQUIRES A MANIFEST UNDER 40CFR262

40CFR264 STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

ESTABLISHES MINIMUM NATIONAL STANDARDS WHICH DEFINE THE ACCEPTABLE MANAGEMENT OF HAZARDOUS WASTE

40CFR265 INTERIM STATUS STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

ESTABLISHES MINIMUM NATIONAL STANDARDS WHICH DEFINE THE ACCEPTABLE MANAGEMENT OF HAZARDOUS WASTE DURING THE PERIOD OF INTERIM STATUS

40CFR267 INTERIM STANDARDS FOR OWNERS AND OPERATORS OF NEW HAZARDOUS WASTE LAND DISPOSAL FACILITIES

ESTABLISHES MINIMUM NATIONAL STANDARDS THAT DEFINE THE ACCEPTABLE MANAGEMENT OF HAZARDOUS WASTE FOR NEW LAND DISPOSAL FACILITIES

40CFR268 LAND DISPOSAL RESTRICTIONS

IDENTIFIES HAZARDOUS WASTES THAT ARE RESTRICTED FROM LAND DISPOSAL AND DEFINES THOSE LIMITED CIRCUMSTANCES UNDER WHICH AN OTHERWISE PROHIBITED WASTE MAY CONTINUE TO BE LAND DISPOSED.

40CFR268.35 WASTE SPECIFIC PROHIBITIONS - THIRD THIRD WASTES
55FR22520 6/1/90

40CFR270 EPA ADMINISTERED PERMIT PROGRAMS: THE HAZARDOUS WASTE PERMIT PROGRAM

ESTABLISHES PROVISIONS FOR THE HAZARDOUS WASTE PERMIT PROGRAM UNDER SUBTITLE C OF THE SOLID WASTE DISPOSAL ACT, AS AMENDED BY THE RESOURCE CONSERVATION AND RECOVERY ACT

40CFR271 REQUIREMENT FOR AUTHORIZATION OF STATE HAZARDOUS WASTE PROGRAMS

SPECIFIES THE PROCEDURES EPA WILL FOLLOW IN APPROVING, REVISING, AND WITHDRAWING APPROVAL OF STATE PROGRAMS AND THE REQUIREMENTS STATE PROGRAMS MUST MEET TO BE APPROVED BY THE ADMINISTRATION UNDER SECTION 3006(B) OF RCRA

40CFR148 HAZARDOUS WASTE INJECTION RESTRICTIONS

THIS SUBSTANCE DOES NOT MEET THE DEFINITION OF A HAZARDOUS WASTE AS
DEFINED BY THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) (40CFR260)

BULLETINS

SPECIAL INFORMATION

TYPE WHAT INFORMATION YOU REQUIRE

ALL, EMER, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), HELP, OR NONE
none

SODIUM BICARBONATE - NO MORE HITS IN DATABASE.

ENTER NAME, KEYWORD, SYMPTOM, STLA, NAMELIST, HELP, OR QUIT.
quit

ENTER WHICH OHS SERVICE YOU WISH TO ACCESS.

- > TO ACCESS HAZARDLINE, TYPE: HAZARD
- > TO ACCESS ENVIRONMENTAL HEALTH NEWS, TYPE: EHN
- > TO ACCESS MATERIAL SAFETY DATA SHEET, TYPE: MSDS
- > TO ACCESS MSDS SUMMARY SHEET, TYPE: SUM
- > TO ACCESS PESTLINE, TYPE: PEST
- > TO EXIT THE SYSTEM, TYPE: LOGOFF

PRESS ENTER KEY AFTER TYPING COMMAND.

logoff

THANK YOU FOR USING OHS ONLINE SYSTEMS.

LOGGED OFF LINE # 01 DATE = 06/28/93 TIME = 12:08:38

LOGOFF COMPLETED - GOODBYE FOR NOW.

gzI

OSHA STANDARD 29CFR1910.141 SANITATION

OSHA STANDARD 29CFR1910.151 MEDICAL SERVICES AND FIRST AID

OSHA STANDARD 29CFR1910.133 EYE AND FACE PROTECTION

29CFR1910.1450 SUBJECT TO OSHA STANDARD REGULATING OCCUPATIONAL EXPOSURE TO HAZARDOUS CHEMICALS IN LABORATORIES.

EFFECTIVE DATE: 5/1/90

55FR3300 1/31/90

40CFR370 SARA TITLE III SECTION 311 HAZARDOUS CHEMICAL REPORTING:
COMMUNITY RIGHT-TO-KNOW
SUBPART B - REPORTING REQUIREMENTS

REPORTING THRESHOLD: 10,000 LBS. (4540 KG)

40CFR370 SARA TITLE III SECTION 312 HAZARDOUS CHEMICAL REPORTING:
COMMUNITY RIGHT-TO-KNOW
SUBPART D - INVENTORY FORMS

SUBSTANCE LISTED TOXIC SUBSTANCES CONTROL ACT INVENTORY

40CFR717 RECORDS AND REPORTS OF ALLEGATIONS THAT CHEMICAL SUBSTANCES CAUSE SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT
SECTION 8(C) OF THE TOXIC SUBSTANCES CONTROL ACT (TSCA) REQUIRES MANUFACTURERS, PROCESSORS, AND DISTRIBUTORS OF CHEMICAL SUBSTANCES AND MIXTURES TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT ALLEGED TO HAVE BEEN CAUSED BY THE SUBSTANCE OR MIXTURE. EPA MAY INSPECT AND REQUIRE REPORTING OF SUCH RECORDS.

21CFR184 DIRECT FOOD SUBSTANCES AFFIRMED AS GENERALLY RECOGNIZED AS AS SAFE

LISTS DIRECT HUMAN FOOD INGREDIENTS THAT HAVE BEEN REVIEWED BY THE FOOD AND DRUG ADMINISTRATION AND DETERMINED TO BE GENERALLY RECOGNIZED AS SAFE (GRAS) FOR THE PURPOSES AND UNDER THE CONDITIONS PRESCRIBED

TRANSPORTATION

* NO DATA AVAILABLE FOR THIS SECTION *

LEAK AND SPILL PROCEDURES

OCCUPATIONAL SPILL:

SWEEP UP AND PLACE IN A SUITABLE CLEAN, DRY CONTAINER FOR LATER DISPOSAL. DO NOT FLUSH WITH WATER. KEEP UNNECESSARY PEOPLE AWAY.

WASTE DISPOSAL

OBSERVE ALL FEDERAL, STATE OR LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. CONTACT LOCAL AND/OR STATE ENVIRONMENTAL AUTHORITIES TO INSURE PROPER COMPLIANCE.

SPECIFIC EMERGENCY PROVISIONS

NO SPECIFIC REQUIREMENT. IF INDICATED BY THE NATURE OF THE SUBSTANCE AND THE PROBABILITY OF EXPOSURE, PROVIDE AN EYE WASH AND FACILITIES FOR QUICK DRENCHING OF THE BODY WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

RESPIRATOR SELECTION

NO SPECIFIC; ADVISE:

- DUST AND MIST RESPIRATOR
- AIR-PURIFYING RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER
- POWERED AIR-PURIFYING RESPIRATOR WITH A DUST AND MIST FILTER
- POWERED AIR-PURIFYING RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER

HIGH LEVELS

- TYPE 'C' SUPPLIED-AIR RESPIRATOR WITH A FULL FACE-PIECE OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE WITH A FULL FACE-PIECE, HELMET, OR HOOD OPERATED IN CONTINUOUS-FLOW MODE
- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE-PIECE OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE

FIREFIGHTING

- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE-PIECE OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE
- SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE WITH AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN POSITIVE PRESSURE MODE

STATUS OF REGULATORY ENFORCEMENT

FEDERAL REGULATIONS

29CFR1910.1200 OSHA HAZARD COMMUNICATION STANDARD

REQUIRES CHEMICAL MANUFACTURERS AND IMPORTERS TO ASSESS THE HAZARDS OF CHEMICALS WHICH THEY PRODUCE OR IMPORT, AND ALL EMPLOYERS TO PROVIDE INFORMATION TO THEIR EMPLOYEES CONCERNING HAZARDOUS CHEMICALS BY MEANS OF A HAZARD COMMUNICATION PROGRAM, LABELS AND OTHER FORMS OF WARNING, MATERIAL SAFETY DATA SHEETS, AND INFORMATION AND TRAINING. REQUIRES DISTRIBUTORS TO TRANSMIT REQUIRED INFORMATION TO EMPLOYEES.

OSHA STANDARD 29CFR1910.94 VENTILATION

OSHA STANDARD 29CFR1910.134 RESPIRATORY PROTECTION

OSHA STANDARD 29CFR1910.20 ACCESS TO EMPLOYEE EXPOSURE AND MEDICAL RECORDS

OSHA STANDARD 29CFR1910.132 PERSONAL PROTECTIVE EQUIPMENT

CAUSE SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT
TOXIC SUBSTANCES CONTROL ACT (TSCA) SECTION 8(C) RULE REQUIRES
MANUFACTURERS AND CERTAIN PROCESSORS OF CHEMICAL SUBSTANCES AND MIXTURES
TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO EMPLOYEE HEALTH FOR
30 YEARS.

NO INFORMATION AVAILABLE FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES
FOR CHEMICAL HAZARDS"; ADVISE:
GENERAL MEDICAL HISTORY
PHYSICIAN PRE-PLACEMENT AND ANNUAL EXAMS

SPECIAL DIAGNOSTIC TESTS
NONE IN COMMON USE

CERTIFICATIONS

NO FEDERAL AGENCY REQUIREMENT, BUT DUE TO HAZARDOUS NATURE OF
SUBSTANCE, ADVISE FOLLOWING:

HEALTH STATUS CLASSIFICATION

OSHA RESPIRATOR CERTIFICATION 29CFR1910.134

DEPARTMENT OF TRANSPORTATION IF OPERATES HEAVY EQUIPMENT

EMPLOYEE HAZARDOUS MATERIALS EDUCATION RECEIPT

EMPLOYEE MEDICAL RECORDS RECEIPT

TOXIC SUBSTANCES CONTROL ACT (TSCA) SECTION 8(C) RULE REQUIRES
MANUFACTURERS AND CERTAIN PROCESSORS OF CHEMICAL SUBSTANCES AND
MIXTURES TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO
EMPLOYEE HEALTH FOR 30 YEARS. CONTACT: CHARLES L. ELKINS, OFFICE OF
TOXIC SUBSTANCES, EPA (202) 382-3813.

MEDICAL WARNING REQUIRED FOR MEDICAL EXAM REFUSAL SIGNED
BY EMPLOYEE

PROTECTIVE CLOTHING AND EQUIPMENT

NO SPECIFIC REQUIREMENT. USE APPROPRIATE PROTECTIVE CLOTHING AS
INDICATED BY THE NATURE OF THE CONTAMINANT AND PROBABILITY OF EXPOSURE.

EYE PROTECTION

NO SPECIFIC REQUIREMENT. USE APPROPRIATE SAFETY GOGGLES, AS INDICATED
BY THE NATURE OF THE CONTAMINANT AND THE LIKELIHOOD OF EXPOSURE.

WASHING CHEMICALS FROM THE SKIN

NO SPECIFIC REQUIREMENT. WASH APPROPRIATELY AS INDICATED BY THE NATURE
OF THE CONTAMINANT AND THE CONDITIONS OF EXPOSURE.

ROUTINE CHANGING OF WORK CLOTHING

NO SPECIFIC REQUIREMENT. IF INDICATED BY THE NATURE OF THE CONTAMINANT
AND THE EXTENT OF EXPOSURE, CHANGE INTO UNCONTAMINATED CLOTHING
BEFORE LEAVING THE WORK PREMISES.

CLOTHING REMOVAL FOLLOWING ACCIDENTAL CONTAMINATION

NO SPECIFIC REQUIREMENT. IF INDICATED BY THE NATURE OF THE CONTAMINANT
AND THE EXTENT OF EXPOSURE, REMOVE CLOTHING AND DO NOT WEAR AGAIN UNTIL
SUBSTANCE HAS BEEN REMOVED FROM CLOTHING.

SKIN ABSORPTION
INGESTION
SKIN OR EYE CONTACT

ORGANS AFFECTED BY THE SUBSTANCE
GASTROINTESTINAL

SYMPTOMS

EYE IRRITATION
SKIN IRRITATION
MUCOUS MEMBRANE IRRITATION
PHARYNGITIS
COUGHING
PULMONARY IRRITATION
NASAL IRRITATION
THROAT IRRITATION
MOUTH IRRITATION
ESOPHAGEAL IRRITATION
STOMACH IRRITATION
ERUCTATION
ALKALOSIS
EDEMA
HYPOGLYCEMIA
CARDIOPULMONARY
WEIGHT GAIN
HEMATURIA
ALBUMINURIA

FIRST AID PROCEDURES

IF THIS CHEMICAL GETS INTO THE EYES, WASH THE EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

IF THIS CHEMICAL GETS ON THE SKIN, REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

IF THIS CHEMICAL HAS BEEN INHALED, REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

IF THIS CHEMICAL IS INGESTED, TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT ASPIRATION.

MEDICAL SURVEILLANCE

29CFR1910.20 OSHA STANDARD

SUBPART C - GENERAL SAFETY AND HEALTH PROVISIONS

PROVIDES FOR EMPLOYEE, DESIGNATED REPRESENTATIVE, AND OSHA ACCESS TO EMPLOYER-MAINTAINED EXPOSURE AND MEDICAL RECORDS RELEVANT TO EMPLOYEES EXPOSED TO TOXIC SUBSTANCES AND HARMFUL PHYSICAL AGENTS.

53FR38140 9/29/88 (AMENDED)

40CFR717 RECORDS AND REPORTS OF ALLEGATIONS THAT CHEMICAL SUBSTANCES

SOLUBILITY IN WATER, G/100 G WATER AT 20C: 10%
FLASH POINT, CLOSED CUP, F (OR OPEN CUP IF 0C): NONCOMBUSTIBLE SOLID
MELTING POINT, F: NOT AVAILABLE
SPECIFIC GRAVITY: 2.159

FIRE AND EXPLOSION

FIRE AND EXPLOSION HAZARDS

NEGLIGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FIREFIGHTING MEDIA

DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR FOAM

FOR LARGER FIRES, USE WATER SPRAY, FOG OR ALCOHOL FOAM

FIREFIGHTING

NO ACUTE HAZARD. MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. AVOID BREATHING VAPORS OR DUSTS; KEEP UPWIND.

INCOMPATIBILITIES

SODIUM BICARBONATE:

ACIDS (STRONG): MAY REACT VIOLENTLY AND RELEASE CARBON DIOXIDE.

2-FURALDEHYDE: POSSIBLE IGNITION HAZARD.

MONOAMMONIUM PHOSPHATE: SELF-PROPAGATING REACTION WITH RAPID BUILD-UP PRESSURE.

SODIUM-POTASSIUM ALLOY: VIOLENT REACTION.

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON.

PERMISSIBLE EXPOSURE LIMIT AND TOXICOLOGY

NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH OR NIOSH

REPRODUCTIVE EFFECTS DATA (RTECS)

MUTAGENIC DATA (RTECS)

CERCLA HAZARD RATINGS - TOXICITY 1 - IGNITABILITY 0 - REACTIVITY 0 -

PERSISTENCE 0

TOXICOLOGY: SODIUM BICARBONATE MAY BE IRRITATING TO THE SKIN, EYES AND MUCOUS MEMBRANES. IT IS MODERATELY TOXIC BY INGESTION. EXPOSURE MAY CAUSE SORE THROAT, COUGHING AND STOMACH IRRITATION. IN THE STOMACH, CARBON DIOXIDE GAS MAY BE RELEASED CAUSING DISTENTION, BELCHING AND POSSIBLY RUPTURE OF THE STOMACH. DOSES GREATER THAN 5 GM/KG MAY CAUSE ALKALOSIS AND EDEMA. INGESTION OF UP TO 40 GM/DAY FOR THREE WEEKS CAUSED CONSIDERABLE WEIGHT GAIN DUE TO FLUID RETENTION, AND IN ONE CASE ALBUMINURIA AND HEMATURIA.

PERSONS WITH RENAL DISORDERS OR HYPERTENSION MAY BE AT AN INCREASED RISK FROM EXPOSURE. INTERACTIONS WITH MEDICATIONS HAVE BEEN REPORTED.

ORL-INF TDLO: 1260 MG/KG

ORL-RAT LD50: 4220 MG/KG

ORL-MUS LD50: 3360 MG/KG

SKIN AND EYE IRRITATION DATA (RTECS)

SKN-HMN 30 MG/3D I MLD

EYE-RBT 100 MG/30 SEC MLD

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONCENTRATION

NONE SPECIFIED

ROUTE OF ENTRY INTO BODY

INHALATION

HAZARDOUS MATERIALS INVOLVED IN A LEAK OR SPILL INCIDENT:

COMBUSTIBLE LIQUID, N.O.S.

IF MATERIAL ON FIRE OR INVOLVED IN FIRE:

- * DO NOT EXTINGUISH FIRE UNLESS FLOW CAN BE STOPPED
- * USE WATER IN FLOODING QUANTITIES AS A FOG
- * SOLID STREAMS OF WATER MAY BE INEFFECTIVE
- * COOL ALL AFFECTED CONTAINERS WITH FLOODING QUANTITIES OF WATER
- * APPLY WATER FROM AS FAR A DISTANCE AS POSSIBLE
- * USE ALCOHOL FOAM, CARBON DIOXIDE, OR DRY CHEMICAL

IF MATERIAL NOT ON FIRE AND NOT INVOLVED IN FIRE:

- * KEEP SPARKS, FLAMES, AND OTHER SOURCES OF IGNITION AWAY
- * KEEP MATERIAL OUT OF WATER SOURCES AND SEWERS
- * BUILD DIKES TO CONTAIN FLOW AS NECESSARY
- * USE WATER SPRAY TO KNOCK-DOWN VAPORS

PERSONNEL PROTECTION:

- * AVOID BREATHING VAPORS
- * KEEP UPWIND
- * AVOID BODILY CONTACT WITH THE MATERIAL
- * DO NOT HANDLE BROKEN PACKAGES WITHOUT PROTECTIVE EQUIPMENT
- * WASH AWAY ANY MATERIAL WHICH MAY HAVE CONTACTED THE BODY WITH COPIOUS AMOUNTS OF WATER OR SOAP AND WATER
- * WEAR SELF-CONTAINED BREATHING APPARATUS WHEN FIGHTING FIRES INVOLVING THIS MATERIAL
- * IF CONTACT WITH MATERIAL ANTICIPATED, WEAR FULL PROTECTIVE CLOTHING

FOLLOWING INFORMATION FROM DEPARTMENT OF TRANSPORTATION/U.S. COAST GUARD "CHEMICAL RESPONSE INFORMATION SYSTEM", REGARDING WATER SPILLS:

- * RESTRICT ACCESS OF GENERAL PUBLIC WHEN APPRECIABLE DANGER ARISES FROM SPILL
- * RESTRICT IGNITION SOURCES WHEN SUBSTANCE INVOLVED
- * CONTAIN SURFACE SLICKS
- * SKIM SURFACE SLICK
- * HIGHLY CORROSIVE, AVOID DIRECT CONTACT, CONTACT WITH SKIN OR EYES CAN CAUSE IRRITATION OR BURNS
- * BURNING MAY BE PROHIBITED BY ANTI-POLLUTION LAWS AND REGULATIONS
- * SUBSTANCE HAS SOOTY BURNING

LISTED BY U.S. COAST GUARD UNDR CARGO COMPATIBILITY GROUP MISCELLANEOUS HYDROCARBON MIXTURES, INCOMPATIBLE WITH NITRIC ACID

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING OR FLAMES IN HAZARD AREA. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. WATER SPRAY MAY REDUCE VAPOR, BUT IT MAY NOT PREVENT IGNITION IN CLOSED SPACES. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER NONCOMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF LIQUID SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND DENY ENTRY.

WASTE DISPOSAL

OBSERVE ALL FEDERAL, STATE OR LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. CONTACT LOCAL AND/OR STATE ENVIRONMENTAL

IDENTIFIES HAZARDOUS WASTES THAT ARE RESTRICTED FROM DISPOSAL INTO CLASS I HAZARDOUS WASTE INJECTION WELLS AND DEFINES THOSE CIRCUMSTANCES UNDER WHICH A WASTE, OTHERWISE PROHIBITED FROM INJECTION, MAY BE INJECTED.

53FR28118 7/26/88
53FR30908 8/16/88
54FR25416 6/14/89
54FR26594 6/23/89

40CFR148.16 WASTE SPECIFIC PROHIBITIONS - THIRD THIRD WASTES

BULLETINS

THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH) RECOMMENDS THAT DIESEL EXHAUST SHOULD BE REGARDED AS A POTENTIAL OCCUPATIONAL CARCINOGEN ON THE BASIS OF EVIDENCE FROM AVAILABLE STUDIES, AND EMPLOYERS SHOULD TAKE STEPS TO LIMIT WORKER EXPOSURE TO THE GREATEST FEASIBLE LIMIT. (NIOSH INTELLIGENCE BULLETIN, JULY 26, 1988).

SPECIAL INFORMATION

MIXTURE OF PARAFFINIC, OLEFINIC, NAPHTHENIC, AND AROMATIC HYDROCARBONS

TYPE WHAT INFORMATION YOU REQUIRE

ALL, EMER, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), HELP, OR NONE
none

DIESEL FUEL IS A SYNONYM OF DIESEL FUEL NO. 2-D

TYPE WHAT INFORMATION YOU REQUIRE

ALL, EMER, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), HELP, OR NONE
all

CHEMICAL NAME

DIESEL FUEL NO. 2-D

CHEMICAL ABSTRACTS SERVICE REGISTRY NUMBER

68476-34-6

REGISTRY OF TOXIC EFFECTS OF CHEMICALS NUMBER

NOT FOUND

CHEMICAL FORMULA

VARIES

SYNONYMS

DIESEL OIL

DIESEL FUEL

DIESEL OIL, MEDIUM

DIESEL OIL NO. 2-D

DIESEL FUEL OIL NO. 2-D

WINTER DIESEL

NO. 2 DIESEL FUEL

OHS07100

PHYSICAL DESCRIPTION

COLORLESS TO YELLOW-BROWN LIQUID WITH A MILD PETROLEUM ODOR.

CHEMICAL AND PHYSICAL PROPERTIES

MOLECULAR WEIGHT: VARIES

BOILING POINT AT 1 ATM, F: 350-680 F (177-360C)
SOLUBILITY IN WATER, G/100 G WATER AT 20C: INSOLUBLE
FLASH POINT, CLOSED CUP, F (OR OPEN CUP IF 0C): >125 F (>52 C)
VAPOR PRESSURE @ 20 C, MMHG: 1 MMHG
MELTING POINT, F: 0 F (-18 C)
UPPER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: 7.5
LOWER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: 0.6
AUTOIGNITION TEMPERATURE: >475 F (>246 C)
SPECIFIC GRAVITY: 0.87 TO 0.90
VAPOR DENSITY (AIR=1): >1

FIRE AND EXPLOSION

FIRE AND EXPLOSION HAZARDS

MODERATE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION AND FLASH BACK.

VAPOR-AIR MIXTURES ARE EXPLOSIVE ABOVE FLASH POINT.

FIREFIGHTING MEDIA

DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN. WITHDRAW IMMEDIATELY IN CASE OF RISING SOUND FROM VENTING SAFETY DEVICE OR ANY DISCOLORATION OF TANK DUE TO FIRE. ISOLATE FOR 1/2 MILE IN ALL DIRECTIONS IF TANK, RAIL CAR OR TANK TRUCK IS INVOLVED IN FIRE (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 27).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED; USE FLOODING AMOUNTS OF WATER AS A FOG, SOLID STREAMS MAY BE INEFFECTIVE. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING VAPORS, KEEP UPWIND.

INCOMPATIBILITIES

STRONG OXIDIZERS

THERMAL DECOMPOSITION PRODUCTS ARE HAZARDOUS AND/OR TOXIC

VAPOR-AIR MIXTURES ARE EXPLOSIVE ABOVE FLASH POINT!

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION AND FLASH BACK.

PERMISSIBLE EXPOSURE LIMIT AND TOXICOLOGY

MINERAL OIL MIST:

5 MG(MINERAL OIL MIST)/M3 OSHA TWA

5 MG(MINERAL OIL MIST)/M3 ACGIH TWA

10 MG(MINERAL OIL MIST)/M3 ACGIH STEL

HYDROGEN SULFIDE:

10 PPM (14 MG/M3) OSHA TWA; 15 PPM (21 MG/M3) OSHA STEL

10 PPM (14 MG/M3) ACGIH TWA; 15 PPM (21 MG/M3) ACGIH STEL

10 PPM (15 MG/M3) NIOSH RECOMMENDED 10 MINUTE CEILING
HUMAN INADEQUATE EVIDENCE FOR CARCINOGENICITY (IARC GROUP-2B)
ANIMAL LIMITED EVIDENCE FOR CARCINOGENICITY (IARC GROUP-2B)
CERCLA HAZARD RATINGS - TOXICITY 3 - IGNITABILITY 2 - REACTIVITY 0 -
PERSISTENCE 1

TOXICOLOGY: DIESEL FUEL NO. 2-D IS A SKIN AND MUCOUS MEMBRANE
IRRITANT. IT IS SLIGHTLY TOXIC BY SKIN ABSORPTION AND RELATIVELY
NON-TOXIC BY INGESTION. IT IS A CENTRAL NERVOUS SYSTEM DEPRESSANT.
POISONING MAY AFFECT THE LIVER AND KIDNEYS. HUMAN EXPOSURE HAS
RESULTED IN IMMEDIATE COUGH, DYSPNEA, CYANOSIS AND UNCONSCIOUSNESS FOR
ONE HOUR. A PRODUCTIVE COUGH WITH SPUTUM SMELLING OF DIESEL FUEL
PERSISTED FOR 37 DAYS. HIGH LEVELS MAY CAUSE CENTRAL NERVOUS SYSTEM
EXCITATION FOLLOWED BY DEPRESSION. CUTANEOUS HYPERKERATOSIS HAS BEEN
DESCRIBED IN ENGINE DRIVERS WITH OCCUPATIONAL EXPOSURE TO DIESEL FUEL.
TWO INDIVIDUALS WITH TOPICAL EXPOSURE FROM WASHING HAIR OR HANDS WITH
DIESEL FUEL DEVELOPED ACUTE RENAL FAILURE; ONE ALSO HAD
GASTROINTESTINAL SYMPTOMS. ANIMAL STUDIES HAVE CONFIRMED AN ASSOCIATION
BETWEEN THE INDUCTION OF CANCER, PRIMARILY OF THE LUNG, AND INHALATION
EXPOSURE TO WHOLE DIESEL EXHAUST. LIMITED EPIDEMIOLOGIC EVIDENCE ALSO
SUGGESTS AN ASSOCIATION BETWEEN OCCUPATIONAL EXPOSURE TO DIESEL ENGINE
EMISSIONS AND LUNG CANCER. (NIOSH 1988).

THE THRESHOLD LIMIT VALUE FOR MINERAL OIL MIST WAS ESTABLISHED TO
PROVIDE A CONSIDERABLE MARGIN OF SAFETY AGAINST EVEN RELATIVELY MINOR
CHANGES IN THE LUNGS.

ORL-RAT LD50: 7.5 GM/KG (AETODY) SKN-RBT LD50: >5 ML/KG (AETODY)

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONCENTRATION
NONE SPECIFIED

ROUTE OF ENTRY INTO BODY
INHALATION
SKIN ABSORPTION
INGESTION
SKIN OR EYE CONTACT

ORGANS AFFECTED BY THE SUBSTANCE

LUNGS
RESPIRATORY SYSTEM
MUCOUS MEMBRANES
SKIN
CENTRAL NERVOUS SYSTEM
KIDNEYS
LIVER

SYMPTOMS

SKIN IRRITATION
EYE IRRITATION
MUCOUS MEMBRANE IRRITATION
ERYTHEMA
SKIN EDEMA
VESICULATION
DERMATITIS
CENTRAL NERVOUS SYSTEM DEPRESSION
HEADACHE
DIZZINESS
GIDDINESS
ANOREXIA
NAUSEA
VOMITING

WEAKNESS
INCOORDINATION
STUPOR
DIARRHEA
ABDOMINAL CRAMPS
COUGHING
DYSPNEA
PULMONARY EDEMA
PULMONARY HEMORRHAGE
KIDNEY DAMAGE
LIVER DAMAGE

FIRST AID PROCEDURES

IF THIS CHEMICAL GETS INTO THE EYES, WASH THE EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

IF THIS CHEMICAL GETS ON THE SKIN, REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

IF THIS CHEMICAL HAS BEEN INHALED, REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION OF PETROLEUM DISTILLATES/HYDROCARBONS:

EMERGENCY TREATMENT - PREVENT ASPIRATION. IF AMOUNT INGESTED EXCEEDS 1 ML/KG, OR IF TOXIC INGREDIENT IS PRESENT, SUBSTANCE MUST BE REMOVED. GASTRIC LAVAGE WITH ACTIVATED CHARCOAL AND CUFFED ENDOTRACHEAL TUBE TO PREVENT ASPIRATION SHOULD BE PERFORMED 15 MINUTES. IN ABSENCE OF DEPRESSION, CONVULSIONS OR GAG REFLEX, IPECAC EMESIS CAN ALSO BE DONE WITHOUT INCREASING ASPIRATION HAZARD. WHEN VOMITING OCCURS, HOLD PATIENT WITH HEAD LOWER THAN HIPS TO PREVENT ASPIRATION. AFTER VOMITING CEASES, GIVE 30-60 ML OF FLEET'S PHOSPHO-SODA DILUTED 1:4 IN WATER. FURTHER TREATMENT: GIVE ARTIFICIAL RESPIRATION WITH OXYGEN IF NECESSARY. SPECIAL TREATMENT: TREAT BACTERIAL ASPIRATION PNEUMONIA BY ORGANISM SPECIFIC CHEMOTHERAPY. TREAT PULMONARY EDEMA. (DREISBACH, HANDBOOK OF POISONING, 12TH ED.)

GASTRIC LAVAGE - GIVE PATIENT GLASS OF WATER PRIOR TO PASSING OF STOMACH TUBE. LAY PATIENT ON ONE SIDE, WITH HEAD LOWER THAN WAIST. IMMOBILIZE A STRUGGLING PATIENT WITH A SHEET OR BLANKET. MEASURE DISTANCE ON TUBE FROM MOUTH TO EPIGASTRIUM, MARK TUBE WITH INDELIBLE MARKING OR TAPE. REMOVE DENTURES AND OTHER FOREIGN OBJECTS FROM THE MOUTH. OPEN MOUTH, USE GAG IF NECESSARY. EXTEND HEAD BY LIFTING CHIN. PASS TUBE OVER TONGUE AND TOWARD BACK OF THROAT WITHOUT EXTENDING HEAD OR NECK. IF OBSTRUCTION IS MET BEFORE THE MARK ON TUBE REACHES LEVELS OF THE TEETH, DO NOT FORCE, BUT REMOVE TUBE AND REPEAT PROCEDURE UNTIL TUBE PASSES TO MARK. PLACE END OF TUBE IN GLASS OF WATER. IF TUBE IS OBSTRUCTED WHEN INTRODUCED ABOUT HALFWAY TO THE MARK, IT MAY HAVE ENTERED TRACHEA.

AFTER TUBE IS PLACED IN STOMACH, ASPIRATE FIRST TO REMOVE STOMACH CONTENTS BY IRRIGATION SYRINGE. SAVE STOMACH CONTENTS FOR EXAMINATION, AND REPEAT INTRODUCTION AND WITHDRAWAL OF 100-300 ML WARM WATER UNTIL AT LEAST 3 LITERS OF CLEAR RETURN ARE OBTAINED. USE ACTIVATED CHARCOAL AT BEGINNING OF LAVAGE TO AID IN POISON INACTIVATION. LEAVE 50 GRAMS OF CHARCOAL SUSPENDED IN WATER IN THE STOMACH. IF INTRODUCTION AND REMOVAL

OF LAVAGE FLUID BY GRAVITY REQUIRES MORE THAN FIVE MINUTES, ASSIST WITH ASEPTO SYRINGE. PREVENT ASPIRATION WITH CUFFED ENDOTRACHEAL TUBE. AVOID GIVING LARGE QUANTITIES OF WATER.

IF PATIENT COMATOSE, INTUBATE TRACHEA WITH CUFFED ENDOTRACHEAL TUBE. SUCCINYLCHLORINE MAY BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL TO EASE INSERTION OF TRACHEAL CATHETER PRIOR TO PASSAGE OF STOMACH TUBE. PROCEDURE MUST BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL.
(DREISBACH, HANDBOOK OF POISONING, 12TH ED.).

ACTIVATED CHARCOAL - GIVE ACTIVATED CHARCOAL WITHIN THE FIRST FEW MINUTES OF POISONING. GIVE PORTIONS EQUIVALENT TO ABOUT 5 ML FOR EACH KILOGRAM OF BODY WEIGHT, ORALLY OR BY GASTRIC LAVAGE. REMOVE BY SUCTION OR EMESIS, AND REPEAT THE PROCEDURE UNTIL A TOTAL OF 100 GM OF CHARCOAL HAS BEEN INTRODUCED AND RECOVERED. EACH GRAM OF ACTIVATED CHARCOAL WILL ADSORB 100-1000 MG OF POISON. DO NOT MIX CHARCOAL WITH OTHER AGENTS TO INCREASE PALATABILITY.
GASTRIC LAVAGE MUST BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL.
(DREISBACH, HANDBOOK OF POISONING, 12TH ED.).

SYRUP OF IPECAC - GIVE 15 ML (ONE TABLESPOON) OF SYRUP OF IPECAC FOLLOWED BY ONE-HALF GLASS OF WATER. IF EMESIS DOES NOT OCCUR IN THIRTY MINUTES, REPEAT WITH SAME DOSE. IF PATIENT MUST BE MOVED, KEEP IN HEAD DOWN POSITION TO FACILITATE EMESIS AND PREVENT ASPIRATION OF VOMITUS. IF EMESIS DOES NOT OCCUR AFTER SYRUP OF IPECAC IS GIVEN, PERFORM GASTRIC LAVAGE TO PREVENT EMETINE POISONING. SAVE SPECIMENS OF EMESIS FOR ANALYSIS. (DREISBACH, HANDBOOK OF POISONING, 12TH ED.)

MEDICAL SURVEILLANCE

29CFR1910.20 OSHA STANDARD

SUBPART C - GENERAL SAFETY AND HEALTH PROVISIONS

PROVIDES FOR EMPLOYEE, DESIGNATED REPRESENTATIVE, AND OSHA ACCESS TO EMPLOYER-MAINTAINED EXPOSURE AND MEDICAL RECORDS RELEVANT TO EMPLOYEES EXPOSED TO TOXIC SUBSTANCES AND HARMFUL PHYSICAL AGENTS.

53FR38140 9/29/88 (AMENDED)

40CFR717 RECORDS AND REPORTS OF ALLEGATIONS THAT CHEMICAL SUBSTANCES CAUSE SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT
TOXIC SUBSTANCES CONTROL ACT (TSCA) SECTION 8(C) RULE REQUIRES MANUFACTURERS AND CERTAIN PROCESSORS OF CHEMICAL SUBSTANCES AND MIXTURES TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO EMPLOYEE HEALTH FOR 30 YEARS.

NO INFORMATION AVAILABLE FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES FOR CHEMICAL HAZARDS"; ADVISE:

GENERAL MEDICAL HISTORY

PHYSICIAN PRE-PLACEMENT AND ANNUAL EXAMS

SPECIAL DIAGNOSTIC TESTS

ELECTROCARDIOGRAM

URINALYSIS

COMPLETE BLOOD COUNT

CERTIFICATIONS

NO FEDERAL AGENCY REQUIREMENT, BUT DUE TO HAZARDOUS NATURE OF SUBSTANCE, ADVISE FOLLOWING:

HEALTH STATUS CLASSIFICATION

TREATMENT, STORAGE, AND DISPOSAL FACILITIES

ESTABLISHES MINIMUM NATIONAL STANDARDS WHICH DEFINE THE ACCEPTABLE MANAGEMENT OF HAZARDOUS WASTE

40CFR265 INTERIM STATUS STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

ESTABLISHES MINIMUM NATIONAL STANDARDS WHICH DEFINE THE ACCEPTABLE MANAGEMENT OF HAZARDOUS WASTE DURING THE PERIOD OF INTERIM STATUS

40CFR267 INTERIM STANDARDS FOR OWNERS AND OPERATORS OF NEW HAZARDOUS WASTE LAND DISPOSAL FACILITIES

ESTABLISHES MINIMUM NATIONAL STANDARDS THAT DEFINE THE ACCEPTABLE MANAGEMENT OF HAZARDOUS WASTE FOR NEW LAND DISPOSAL FACILITIES

40CFR268 LAND DISPOSAL RESTRICTIONS

IDENTIFIES HAZARDOUS WASTES THAT ARE RESTRICTED FROM LAND DISPOSAL AND DEFINES THOSE LIMITED CIRCUMSTANCES UNDER WHICH AN OTHERWISE PROHIBITED WASTE MAY CONTINUE TO BE LAND DISPOSED.

40CFR268.35 WASTE SPECIFIC PROHIBITIONS - THIRD THIRD WASTES
55FR22520 6/1/90

40CFR148 HAZARDOUS WASTE INJECTION RESTRICTIONS

IDENTIFIES HAZARDOUS WASTES THAT ARE RESTRICTED FROM DISPOSAL INTO CLASS I HAZARDOUS WASTE INJECTION WELLS AND DEFINES THOSE CIRCUMSTANCES UNDER WHICH A WASTE, OTHERWISE PROHIBITED FROM INJECTION, MAY BE INJECTED.

53FR28118 7/26/88
53FR30908 8/16/88
54FR25416 6/14/89
54FR26594 6/23/89

40CFR148.16 WASTE SPECIFIC PROHIBITIONS - THIRD THIRD WASTES

40CFR270 EPA ADMINISTERED PERMIT PROGRAMS: THE HAZARDOUS WASTE PERMIT PROGRAM

ESTABLISHES PROVISIONS FOR THE HAZARDOUS WASTE PERMIT PROGRAM UNDER SUBTITLE C OF THE SOLID WASTE DISPOSAL ACT, AS AMENDED BY THE RESOURCE CONSERVATION AND RECOVERY ACT

40CFR271 REQUIREMENT FOR AUTHORIZATION OF STATE HAZARDOUS WASTE PROGRAMS

SPECIFIES THE PROCEDURES EPA WILL FOLLOW IN APPROVING, REVISING, AND WITHDRAWING APPROVAL OF STATE PROGRAMS AND THE REQUIREMENTS STATE PROGRAMS MUST MEET TO BE APPROVED BY THE ADMINISTRATION UNDER SECTION 3006(B) OF RCRA

OF AIR TRANSPORTATION.

ADDITIONAL INFORMATION

SUBSTANCE ESTABLISHED AS CONFIRMED OR SUSPECTED CARCINOGEN (POTENTIAL CARCINOGEN) BY THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC)

TRANSPORTATION

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49-CFR 172.101:

COMBUSTIBLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49-CFR 172.101 AND SUBPART E:

NONE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: NONE

EXCEPTIONS: 49-CFR 173.118A

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180), DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204. EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO OCTOBER 1, 1993. (56 FR 47158, 09/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101: DIESEL FUEL-NA 1993

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101: 3 - FLAMMABLE LIQUID

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101: PG III

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101

AND SUBPART E:

NONE

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:

EXCEPTIONS: 49 CFR 173.150

NON-BULK PACKAGING: 49 CFR 173.203

BULK PACKAGING: 49 CFR 173.241

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:

PASSENGER AIRCRAFT OR RAILCAR: 60 L

CARGO AIRCRAFT ONLY: 220 L

LEAK AND SPILL PROCEDURES

FOLLOWING INFORMATION RECOMMENDED FOR THE EMERGENCY HANDLING OF

53FR30908 8/16/88
54FR25416 6/14/89
54FR26594 6/23/89

40CFR370 SARA TITLE III SECTION 311 HAZARDOUS CHEMICAL REPORTING:
COMMUNITY RIGHT-TO-KNOW
SUBPART B - REPORTING REQUIREMENTS

REPORTING THRESHOLD: 10,000 LBS. (4540 KG)

HAZARD CATEGORIES:

ACUTE HAZARD

CHRONIC HAZARD

FIRE HAZARD

40CFR370 SARA TITLE III SECTION 312 HAZARDOUS CHEMICAL REPORTING:
COMMUNITY RIGHT-TO-KNOW
SUBPART D - INVENTORY FORMS

SUBSTANCE LISTED TOXIC SUBSTANCES CONTROL ACT INVENTORY

40CFR717 RECORDS AND REPORTS OF ALLEGATIONS THAT CHEMICAL SUBSTANCES
CAUSE SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT
SECTION 8(C) OF THE TOXIC SUBSTANCES CONTROL ACT (TSCA) REQUIRES
MANUFACTURERS, PROCESSORS, AND DISTRIBUTORS OF CHEMICAL SUBSTANCES
AND MIXTURES TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO
HEALTH OR THE ENVIRONMENT ALLEGED TO HAVE BEEN CAUSED BY THE SUBSTANCE
OR MIXTURE. EPA MAY INSPECT AND REQUIRE REPORTING OF SUCH RECORDS.

49CFR172.101 TABLES OF HAZARDOUS MATERIALS, THEIR DESCRIPTION, PROPER
SHIPPING NAME, CLASS, LABEL, PACKAGING, AND OTHER REQUIREMENTS
DESIGNATED IN HAZARDOUS MATERIALS TABLE AS HAZARDOUS MATERIAL (UNDER
N.O.S. CATEGORY) FOR THE PURPOSE OF TRANSPORTATION.

INTERNATIONAL MARITIME ORGANIZATION (IMO) - DANGEROUS GOODS CODE
SUBSTANCE REGULATED BY N.O.S. CATEGORY FOR INTERNATIONAL SHIPMENTS

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA) - TABLE 4.2
DANGEROUS GOODS LIST: THEIR DESCRIPTION, PROPER SHIPPING NAME, CLASS,
LABEL, PACKAGING AND OTHER REQUIREMENTS.
DESIGNATED AS A DANGEROUS GOOD (UNDER N.O.S. CATEGORY) FOR THE PURPOSE
OF AIR TRANSPORTATION.

46CFR30.25 COMMODITIES REGULATED BY THE COAST GUARD
SUBSTANCE LISTED UNDER FLAMMABLE AND COMBUSTIBLE BULK LIQUID CARGOES

16CFR1500.14 PRODUCTS REQUIRING SPECIAL LABELING UNDER SECTION
3(B) OF THE FEDERAL HAZARDOUS SUBSTANCES ACT

INTERNATIONAL REGULATIONS

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA) - TABLE 4.2
DANGEROUS GOODS LIST: THEIR DESCRIPTION, PROPER SHIPPING NAME, CLASS,
LABEL, PACKAGING AND OTHER REQUIREMENTS.
DESIGNATED AS A DANGEROUS GOOD (UNDER N.O.S. CATEGORY) FOR THE PURPOSE

AUTHORITIES TO INSURE PROPER COMPLIANCE.

THIS SUBSTANCE MEETS THE DEFINITION OF A HAZARDOUS WASTE AS DEFINED BY THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) (40CFR260) AND IS SUBJECT TO THE FOLLOWING CONSIDERATIONS:

40CFR260 HAZARDOUS WASTE MANAGEMENT SYSTEM: GENERAL

PROVIDES DEFINITIONS OF TERMS, GENERAL STANDARDS, AND OVERVIEW INFORMATION APPLICABLE TO 40CFR PARTS 260-265

40CFR261 IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

IDENTIFIES THOSE SOLID WASTES WHICH ARE SUBJECT TO REGULATION AS HAZARDOUS WASTES UNDER 40CFR PARTS 262-265, 270, 271, AND 124 AND WHICH ARE SUBJECT TO THE NOTIFICATION REQUIREMENTS OF SECTION 3010 OF THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) AND IDENTIFIES ONLY SOME OF THE MATERIALS WHICH ARE HAZARDOUS WASTES UNDER SECTIONS 3007 AND 7003 OF RCRA

THIS COMPOUND, DEPENDING ON THE CHARACTERISTIC, CONCENTRATION AND/OR SOURCE OF THE WASTE, MAY BE REGULATED UNDER THE FOLLOWING WASTE NUMBER(S) AND, IN TURN, SUBJECT TO THE CORRESPONDING REPORTABLE QUANTITY (RQ) (IF APPLICABLE):

40CFR261.21 CHARACTERISTIC OF IGNITABILITY

EPA HAZARDOUS WASTE NUMBER D001

REPORTABLE QUANTITY (RQ) : 100 LBS.

A REPORTABLE QUANTITY OF 100 LBS. APPLIES TO THIS WASTE ADJUSTED UNDER SECTION 102(A) OF THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT OF 1980 (CERCLA) BY EXHIBITING ONE OR MORE OF THE CHARACTERISTICS OF IGNITABILITY, CORROSIVITY OR REACTIVITY IDENTIFIED IN 40CFR261.21 THROUGH 261.23. SECTIONS 103(A) AND 103(B) REQUIRE THAT PERSONS IN CHARGE OF A VESSEL OR FACILITY FROM WHICH A HAZARDOUS SUBSTANCE HAS BEEN RELEASED IN A QUANTITY EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY IMMEDIATELY NOTIFY THE NATIONAL RESPONSE CENTER (800) 424-8802; IN WASHINGTON, D.C. METROPOLITAN AREA (202) 426-2675.
50FR13456 4/4/85

40CFR262 STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE

ESTABLISHES STANDARDS FOR GENERATORS OF HAZARDOUS WASTE

40CFR263 STANDARDS APPLICABLE TO TRANSPORTERS OF HAZARDOUS WASTE

ESTABLISHES STANDARDS WHICH APPLY TO PERSONS TRANSPORTING HAZARDOUS WASTE WITHIN THE UNITED STATES IF THE TRANSPORTATION REQUIRES A MANIFEST UNDER 40CFR262

40CFR264 STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE

FIREFIGHTING

- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE-PIECE OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE
- SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE WITH AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN POSITIVE PRESSURE MODE

STATUS OF REGULATORY ENFORCEMENT

FEDERAL REGULATIONS

29CFR1910.1200 OSHA HAZARD COMMUNICATION STANDARD

REQUIRES CHEMICAL MANUFACTURERS AND IMPORTERS TO ASSESS THE HAZARDS OF CHEMICALS WHICH THEY PRODUCE OR IMPORT, AND ALL EMPLOYERS TO PROVIDE INFORMATION TO THEIR EMPLOYEES CONCERNING HAZARDOUS CHEMICALS BY MEANS OF A HAZARD COMMUNICATION PROGRAM, LABELS AND OTHER FORMS OF WARNING, MATERIAL SAFETY DATA SHEETS, AND INFORMATION AND TRAINING. REQUIRES DISTRIBUTORS TO TRANSMIT REQUIRED INFORMATION TO EMPLOYEES.

OSHA STANDARD 29CFR1910.94 VENTILATION

OSHA STANDARD 29CFR1910.134 RESPIRATORY PROTECTION

OSHA STANDARD 29CFR1910.20 ACCESS TO EMPLOYEE EXPOSURE AND MEDICAL RECORDS

OSHA STANDARD 29CFR1910.132 PERSONAL PROTECTIVE EQUIPMENT

OSHA STANDARD 29CFR1910.141 SANITATION

OSHA STANDARD 29CFR1910.151 MEDICAL SERVICES AND FIRST AID

OSHA STANDARD 29CFR1910.133 EYE AND FACE PROTECTION

OSHA STANDARD 29CFR1910.106 FLAMMABLE AND COMBUSTIBLE LIQUIDS

APPLIES TO THE HANDLING, STORAGE, AND USE OF FLAMMABLE AND COMBUSTIBLE LIQUIDS WITH A FLASH POINT BELOW 200 F

29CFR1910.1450 SUBJECT TO OSHA STANDARD REGULATING OCCUPATIONAL EXPOSURE TO HAZARDOUS CHEMICALS IN LABORATORIES.

EFFECTIVE DATE: 5/1/90

55FR3300 1/31/90

40CFR261 IDENTIFICATION AND LISTING OF HAZARDOUS WASTES

40CFR268 LAND DISPOSAL RESTRICTIONS

40CFR148 HAZARDOUS WASTE INJECTION RESTRICTIONS.

53FR28118 7/26/88

OSHA RESPIRATOR CERTIFICATION 29CFR1910.134

DEPARTMENT OF TRANSPORTATION IF OPERATES HEAVY EQUIPMENT

EMPLOYEE HAZARDOUS MATERIALS EDUCATION RECEIPT

EMPLOYEE MEDICAL RECORDS RECEIPT

TOXIC SUBSTANCES CONTROL ACT (TSCA) SECTION 8(C) RULE REQUIRES MANUFACTURERS AND CERTAIN PROCESSORS OF CHEMICAL SUBSTANCES AND MIXTURES TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO EMPLOYEE HEALTH FOR 30 YEARS. CONTACT: CHARLES L. ELKINS, OFFICE OF TOXIC SUBSTANCES, EPA (202) 382-3813.

MEDICAL WARNING REQUIRED FOR MEDICAL EXAM REFUSAL SIGNED BY EMPLOYEE

-PROTECTIVE CLOTHING AND EQUIPMENT

EMPLOYERS SHALL PROVIDE AND ENSURE THAT EMPLOYEES USE APPROPRIATE PROTECTIVE CLOTHING AND EQUIPMENT NECESSARY TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE. FACE SHIELDS SHALL COMPLY WITH 29CFR1910.133(A)(2), (A)(4), (A)(5), AND (A)(6).

EYE PROTECTION

- NO SPECIFIC REQUIREMENT. USE APPROPRIATE SAFETY GOGGLES, AS INDICATED BY THE NATURE OF THE CONTAMINANT AND THE LIKELIHOOD OF EXPOSURE.

_WASHING CHEMICALS FROM THE SKIN

EMPLOYERS SHALL ENSURE THAT EMPLOYEES WHO HANDLE THIS SUBSTANCE WASH THEIR HANDS THOROUGHLY WITH SOAP OR MILD DETERGENT AND WATER BEFORE EATING, SMOKING, OR USING TOILET FACILITIES.

ROUTINE CHANGING OF WORK CLOTHING

- NO SPECIFIC REQUIREMENT. IF INDICATED BY THE NATURE OF THE CONTAMINANT AND THE EXTENT OF EXPOSURE, CHANGE INTO UNCONTAMINATED CLOTHING BEFORE LEAVING THE WORK PREMISES.

_CLOTHING REMOVAL FOLLOWING ACCIDENTAL CONTAMINATION

NO SPECIFIC REQUIREMENT. IF INDICATED BY THE NATURE OF THE CONTAMINANT AND THE EXTENT OF EXPOSURE, REMOVE CLOTHING AND DO NOT WEAR AGAIN UNTIL SUBSTANCE HAS BEEN REMOVED FROM CLOTHING.

SPECIFIC EMERGENCY PROVISIONS

- NO SPECIFIC REQUIREMENT. IF INDICATED BY THE NATURE OF THE SUBSTANCE AND THE PROBABILITY OF EXPOSURE, PROVIDE AN EYE WASH AND FACILITIES FOR QUICK DRENCHING OF THE BODY WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

RESPIRATOR SELECTION

-HIGH LEVELS

- TYPE 'C' SUPPLIED-AIR RESPIRATOR WITH A FULL FACE-PIECE OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE WITH A FULL FACE-PIECE, HELMET, OR HOOD OPERATED IN CONTINUOUS-FLOW MODE
- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE-PIECE OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE

CONSERVATION AND RECOVERY ACT

40CFR271 REQUIREMENT FOR AUTHORIZATION OF STATE HAZARDOUS WASTE PROGRAMS

SPECIFIES THE PROCEDURES EPA WILL FOLLOW IN APPROVING, REVISING, AND WITHDRAWING APPROVAL OF STATE PROGRAMS AND THE REQUIREMENTS STATE PROGRAMS MUST MEET TO BE APPROVED BY THE ADMINISTRATION UNDER SECTION 3006(B) OF RCRA

BULLETINS

SPECIAL INFORMATION

TYPE WHAT INFORMATION YOU REQUIRE

ALL, EMER, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), HELP, OR NONE
none

TOLUENE - NO MORE HITS IN DATABASE.

ENTER NAME, KEYWORD, SYMPTOM, STLA, NAMELIST, HELP, OR QUIT.
name

ENTER CHEMICAL NAME
ethylbenzene

ETHYLBENZENE IS A SYNONYM OF ETHYL BENZENE

TYPE WHAT INFORMATION YOU REQUIRE

ALL, EMER, SPECIFIC INFORMATION (BY 4-LETTER COMMAND), HELP, OR NONE
all

CHEMICAL NAME
ETHYL BENZENE

CHEMICAL ABSTRACTS SERVICE REGISTRY NUMBER
100-41-4

REGISTRY OF TOXIC EFFECTS OF CHEMICALS NUMBER
DA0700000

CHEMICAL FORMULA
C8H10

SYNONYMS

PHENYLETHANE

ETHYLBENZOL

NCI-C56393

UN 1175

ETHYLBENZENE

BENZENE, ETHYL

EB

ALPHA-METHYLTOLUENE

STCC 4909163

OHS08780

PHYSICAL DESCRIPTION

CLEAR, COLORLESS LIQUID WITH AN AROMATIC ODOOR.

CHEMICAL AND PHYSICAL PROPERTIES

MOLECULAR WEIGHT: 106.17
BOILING POINT AT 1 ATM, F: 277 F (136 C)
SOLUBILITY IN WATER, G/100 G WATER AT 20C: 0.015%
FLASH POINT, CLOSED CUP, F (OR OPEN CUP IF OC): 59 F (15 C)
VAPOR PRESSURE @ 20 C, MMHG: 7.1 MMHG
MELTING POINT, F: -139 F (-95 C)
UPPER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: 6.7%
LOWER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: 0.8%
AUTOIGNITION TEMPERATURE: 810 F (432 C)
SPECIFIC GRAVITY: 0.867
VAPOR DENSITY (AIR=1): 3.7
ODOR THRESHOLD: 140 PPM
OCTANOL/WATER PARTITION COEFFICIENT: 3.15

FIRE AND EXPLOSION

FIRE AND EXPLOSION HAZARDS
DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

VAPOR-AIR MIXTURES ARE EXPLOSIVE.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION AND FLASH BACK.

DUE TO LOW ELECTROCONDUCTIVITY OF THE SUBSTANCE, FLOW OR AGITATION MAY GENERATE ELECTROSTATIC CHARGES RESULTING IN SPARKS WITH POSSIBLE IGNITION.

FIREFIGHTING MEDIA

DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM
(1993 EMERGENCY RESPONSE GUIDEBOOK, RSPA P 5800.6).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1993 EMERGENCY RESPONSE GUIDEBOOK, RSPA P 5800.6).

FIREFIGHTING

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN. WITHDRAW IMMEDIATELY IN CASE OF RISING SOUND FROM VENTING SAFETY DEVICE OR ANY DISCOLORATION OF TANK DUE TO FIRE. ISOLATE FOR 1/2 MILE IN ALL DIRECTIONS IF TANK, RAIL CAR OR TANK TRUCK IS INVOLVED IN FIRE (1993 EMERGENCY RESPONSE GUIDEBOOK, RSPA P 5800.6, GUIDE PAGE 27).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED; USE FLOODING AMOUNTS OF WATER AS A FOG, SOLID STREAMS MAY BE INEFFECTIVE. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING VAPORS, KEEP UPWIND.

WATER MAY BE INEFFECTIVE (NFPA 325H, FIRE HAZARD PROPERTIES OF FLAMMABLE LIQUIDS, GASES, AND VOLATILE SOLIDS, 1991)

INCOMPATIBILITIES

ETHYL BENZENE:
ACIDS (STRONG): POSSIBLE VIOLENT REACTION.
AMMONIA: POSSIBLE VIOLENT REACTION.

BASES (STRONG): POSSIBLE VIOLENT REACTION.
OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.
PLASTICS: MAY BE ATTACKED.

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON.

VAPOR-AIR MIXTURES ARE EXPLOSIVE.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION AND FLASH BACK.

DUE TO LOW ELECTROCONDUCTIVITY OF THE SUBSTANCE, FLOW OR AGITATION MAY GENERATE ELECTROSTATIC CHARGES RESULTING IN SPARKS WITH POSSIBLE IGNITION.

PERMISSIBLE EXPOSURE LIMIT AND TOXICOLOGY

100 PPM (434 MG/M3) OSHA TWA; 125 PPM (543 MG/M3) OSHA STEL
100 PPM (434 MG/M3) ACGIH TWA; 125 PPM (543 MG/M3) ACGIH STEL
100 PPM (434 MG/M3) NIOSH RECOMMENDED 10 HR TWA
125 PPM (543 MG/M3) NIOSH RECOMMENDED STEL
REPRODUCTIVE EFFECTS DATA (RTECS); MUTAGENIC DATA (RTECS)
AQUATIC TOXICITY RATING 2 (TLM96 10 - 100 PPM)

TLM96 - BLUEGILL 32 PPM (SOFT WATER), FATHEAD 48.51 PPM (SOFT WATER)
- FATHEAD 42.33 PPM (HARD WATER)

CERCLA HAZARD RATINGS - TOXICITY 2 - IGNITABILITY 3 - REACTIVITY 0 - PERSISTENCE 3

TOXICOLOGY: ETHYL BENZENE IS A SKIN, EYE AND MUCOUS MEMBRANE IRRITANT. IT IS MODERATELY TOXIC BY INGESTION AND SLIGHTLY TOXIC BY SKIN ABSORPTION. ETHYL BENZENE IS A CENTRAL NERVOUS SYSTEM DEPRESSANT. POISONING MAY AFFECT THE LIVER. EXPOSURE TO HIGH CONCENTRATIONS MAY CAUSE COUGH, FATIGUE, A SENSE OF CHEST CONSTRICTION, MARCOSIS AND POSSIBLY DEATH DUE TO RESPIRATORY PARALYSIS. EYE IRRITATION AND LACRIMATION MAY OCCUR ABOVE 1000 PPM WITH TOLERANCE DEVELOPING QUICKLY AND MAY BE SEVERE ABOVE 2000 PPM. AT 5000 PPM IRRITATION IS INTOLERABLE. THE LIQUID MAY BE ABSORBED THROUGH THE SKIN AT A RATE OF 22-33 MG/CM2/HOUR AND POSSIBLY CAUSE SYSTEMIC TOXICITY. REPEATED EXPOSURE MAY CAUSE SLEEPINESS, IRRITABILITY AND FUNCTIONAL NERVOUS DISORDERS.

THE ODOR CAN BE DETECTED BELOW IRRITATION BEGINS AND, THEREFORE, IS CONSIDERED TO HAVE ADEQUATE WARNING PROPERTIES. THE THRESHOLD LIMIT VALUE WAS ESTABLISHED TO PREVENT EYE AND SKIN IRRITATION.

PERSONS WITH PRE-EXISTING SKIN DISORDERS OR IMPAIRED PULMONARY, RENAL, OR LIVER FUNCTION MAY BE AT AN INCREASED RISK FROM EXPOSURE.

ETHYL BENZENE MAY CROSS THE PLACENTA.

1HL-HMN TCLO: 100 PPM/8 H ORL-RAT LD50: 3500 MG/KG
SKN-RBT LD50: 17,800 MG/KG 1PR-MUS LD50: 2272 MG/KG
1HL-RAT LCLO: 4000 PPM/4 H 1HL-GPG LCLO: 10,000 PPM
SKIN AND EYE IRRITATION DATA (RTECS)
SKN-RBT 15 MG/24 H OPEN MLD EYE-RBT 100 MG

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONCENTRATION
2000 PPM

OSHA/NIOSH

ROUTE OF ENTRY INTO BODY

INHALATION
INGESTION
SKIN ABSORPTION
SKIN OR EYE CONTACT

ORGANS AFFECTED BY THE SUBSTANCE

EYES
SKIN
RESPIRATORY SYSTEM
CENTRAL NERVOUS SYSTEM
GASTROINTESTINAL
LIVER

SYMPTOMS

SKIN IRRITATION
EYE IRRITATION
MUCOUS MEMBRANE IRRITATION
COUGHING
FATIGUE
DEPRESSION
DIZZINESS
VERTIGO
DYSPNEA
HEADACHE
MARCOSIS
SLEEPINESS
IRRITABILITY
SKIN INFLAMMATION
SKIN BURNS
LACRIMATION
ABDOMINAL PAIN
NAUSEA
VOMITING
PULMONARY HEMORRHAGE
PULMONARY EDEMA
COMA
RESPIRATORY PARALYSIS
LIVER EFFECTS
KIDNEY EFFECTS
BLOOD EFFECTS
REPRODUCTIVE EFFECTS IN EXPERIMENTAL ANIMALS

FIRST AID PROCEDURES

IF THIS CHEMICAL GETS INTO THE EYES, WASH THE EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

IF THIS CHEMICAL GETS ON THE SKIN, REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION IMMEDIATELY.

IF THIS CHEMICAL HAS BEEN INHALED, REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY AND BLOOD PRESSURE AND ADMINISTER OXYGEN IF AVAILABLE. KEEP AFFECTED PERSON WARM AND AT REST. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION OF PETROLEUM DISTILLATES/HYDROCARBONS:
EMERGENCY TREATMENT - PREVENT ASPIRATION. IF AMOUNT INGESTED EXCEEDS

1 ML/KG, OR IF TOXIC INGREDIENT IS PRESENT, SUBSTANCE MUST BE REMOVED. GASTRIC LAVAGE WITH ACTIVATED CHARCOAL AND CUFFED ENDOTRACHEAL TUBE TO PREVENT ASPIRATION SHOULD BE PERFORMED 15 MINUTES. IN ABSENCE OF DEPRESSION, CONVULSIONS OR GAG REFLEX, IPECAC EMESIS CAN ALSO BE DONE WITHOUT INCREASING ASPIRATION HAZARD. WHEN VOMITING OCCURS, HOLD PATIENT WITH HEAD LOWER THAN HIPS TO PREVENT ASPIRATION. AFTER VOMITING CEASES, GIVE 30-60 ML OF FLEET'S PHOSPHO-SODA DILUTED 1:4 IN WATER. FURTHER TREATMENT: GIVE ARTIFICIAL RESPIRATION WITH OXYGEN IF NECESSARY. SPECIAL TREATMENT: TREAT BACTERIAL ASPIRATION PNEUMONIA BY ORGANISM SPECIFIC CHEMOTHERAPY. TREAT PULMONARY EDEMA. (DREISBACH, HANDBOOK OF POISONING, 12TH ED.)

GASTRIC LAVAGE - GIVE PATIENT GLASS OF WATER PRIOR TO PASSING OF STOMACH TUBE. LAY PATIENT ON ONE SIDE, WITH HEAD LOWER THAN WAIST. IMMOBILIZE A STRUGGLING PATIENT WITH A SHEET OR BLANKET. MEASURE DISTANCE ON TUBE FROM MOUTH TO EPIGASTRIUM, MARK TUBE WITH INDELIBLE MARKING OR TAPE. REMOVE DENTURES AND OTHER FOREIGN OBJECTS FROM THE MOUTH. OPEN MOUTH, USE GAG IF NECESSARY. EXTEND HEAD BY LIFTING CHIN. PASS TUBE OVER TONGUE AND TOWARD BACK OF THROAT WITHOUT EXTENDING HEAD OR NECK. IF OBSTRUCTION IS MET BEFORE THE MARK ON TUBE REACHES LEVELS OF THE TEETH, DO NOT FORCE, BUT REMOVE TUBE AND REPEAT PROCEDURE UNTIL TUBE PASSES TO MARK. PLACE END OF TUBE IN GLASS OF WATER. IF TUBE IS OBSTRUCTED WHEN INTRODUCED ABOUT HALFWAY TO THE MARK, IT MAY HAVE ENTERED TRACHEA.

AFTER TUBE IS PLACED IN STOMACH, ASPIRATE FIRST TO REMOVE STOMACH CONTENTS BY IRRIGATION SYRINGE. SAVE STOMACH CONTENTS FOR EXAMINATION, AND REPEAT INTRODUCTION AND WITHDRAWAL OF 100-300 ML WARM WATER UNTIL AT LEAST 3 LITERS OF CLEAR RETURN ARE OBTAINED. USE ACTIVATED CHARCOAL AT BEGINNING OF LAVAGE TO AID IN POISON INACTIVATION. LEAVE 50 GRAMS OF CHARCOAL SUSPENDED IN WATER IN THE STOMACH. IF INTRODUCTION AND REMOVAL OF LAVAGE FLUID BY GRAVITY REQUIRES MORE THAN FIVE MINUTES, ASSIST WITH ASEPTO SYRINGE. PREVENT ASPIRATION WITH CUFFED ENDOTRACHEAL TUBE. AVOID GIVING LARGE QUANTITIES OF WATER.

IF PATIENT COMATOSE, INTUBATE TRACHEA WITH CUFFED ENDOTRACHEAL TUBE. SUCCINYLCHLORINE MAY BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL TO EASE INSERTION OF TRACHEAL CATHETER PRIOR TO PASSAGE OF STOMACH TUBE. PROCEDURE MUST BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL. (DREISBACH, HANDBOOK OF POISONING, 12TH ED.)

ACTIVATED CHARCOAL - GIVE ACTIVATED CHARCOAL WITHIN THE FIRST FEW MINUTES OF POISONING. GIVE PORTIONS EQUIVALENT TO ABOUT 5 ML FOR EACH KILOGRAM OF BODY WEIGHT, ORALLY OR BY GASTRIC LAVAGE. REMOVE BY SUCTION OR EMESIS, AND REPEAT THE PROCEDURE UNTIL A TOTAL OF 100 GM OF CHARCOAL HAS BEEN INTRODUCED AND RECOVERED. EACH GRAM OF ACTIVATED CHARCOAL WILL ADSORB 100-1000 MG OF POISON. DO NOT MIX CHARCOAL WITH OTHER AGENTS TO INCREASE PALATABILITY. GASTRIC LAVAGE MUST BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL. (DREISBACH, HANDBOOK OF POISONING, 12TH ED.)

MEDICAL SURVEILLANCE

29CFR1910.20 OSHA STANDARD

SUBPART C - GENERAL SAFETY AND HEALTH PROVISIONS

PROVIDES FOR EMPLOYEE, DESIGNATED REPRESENTATIVE, AND OSHA ACCESS TO EMPLOYER-MAINTAINED EXPOSURE AND MEDICAL RECORDS RELEVANT TO EMPLOYEES EXPOSED TO TOXIC SUBSTANCES AND HARMFUL PHYSICAL AGENTS.

53FR38140 9/29/88 (AMENDED)

40CFR17 RECORDS AND REPORTS OF ALLEGATIONS THAT CHEMICAL SUBSTANCES CAUSE SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT
TOXIC SUBSTANCES CONTROL ACT (TSCA) SECTION 8(C) RULE REQUIRES
MANUFACTURERS AND CERTAIN PROCESSORS OF CHEMICAL SUBSTANCES AND MIXTURES
TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO EMPLOYEE HEALTH FOR
30 YEARS.

FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES
FOR CHEMICAL HAZARDS"

GENERAL MEDICAL HISTORY
PHYSICIAN PRE-PLACEMENT AND ANNUAL EXAMS
CHRONIC RESPIRATORY DISEASE
KIDNEY FUNCTION
LIVER FUNCTION
SKIN DISEASE

OTHER MEDICAL SURVEILLANCE RECOMMENDED:

BLOOD DISEASE
EYE DISEASE

ACGIH BIOLOGICAL EXPOSURE INDICES FOR ETHYL BENZENE:

2 G/L MANDELIC ACID IN URINE / TIMING--END OF SHIFT AND
END OF WORKWEEK
1.5 G/G CREAT. MANDELIC ACID IN URINE / TIMING -- END OF SHIFT
AND END OF WORKWEEK
2 PPM ETHYL BENZENE IN END-EXHALED AIR /TIMING--PRIOR TO NEXT SHIFT

SPECIAL DIAGNOSTIC TESTS
RED BLOOD CELL COUNT
URINALYSIS

CERTIFICATIONS
NO FEDERAL AGENCY REQUIREMENT, BUT DUE TO HAZARDOUS NATURE OF
SUBSTANCE, ADVISE FOLLOWING:

HEALTH STATUS CLASSIFICATION

OSHA RESPIRATOR CERTIFICATION 29CFR1910.134

DEPARTMENT OF TRANSPORTATION IF OPERATES HEAVY EQUIPMENT

EMPLOYEE HAZARDOUS MATERIALS EDUCATION RECEIPT

EMPLOYEE MEDICAL RECORDS RECEIPT

TOXIC SUBSTANCES CONTROL ACT (TSCA) SECTION 8(C) RULE REQUIRES
MANUFACTURERS AND CERTAIN PROCESSORS OF CHEMICAL SUBSTANCES AND
MIXTURES TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO
EMPLOYEE HEALTH FOR 30 YEARS. CONTACT: CHARLES L. ELKINS, OFFICE OF
TOXIC SUBSTANCES, EPA (202) 382-3813.

MEDICAL WARNING REQUIRED FOR MEDICAL EXAM REFUSAL SIGNED
BY EMPLOYEE

PROTECTIVE CLOTHING AND EQUIPMENT
FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES
FOR CHEMICAL HAZARDS":

EMPLOYERS SHALL PROVIDE AND ENSURE THAT EMPLOYEES USE APPROPRIATE PROTECTIVE CLOTHING AND EQUIPMENT NECESSARY TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE. FACE SHIELDS SHALL COMPLY WITH 29CFR1910.133(A)(2), (A)(4), (A)(5), AND (A)(6).

EMPLOYERS SHALL ENSURE THAT CLOTHING WET WITH THIS SUBSTANCE IS PLACED IN CLOSED CONTAINERS FOR STORAGE UNTIL IT CAN BE DISCARDED OR UNTIL THE EMPLOYER PROVIDES FOR THE REMOVAL OF THE CONTAMINANT FROM THE CLOTHING. IF THE CLOTHING IS TO BE LAUNDERED OR OTHERWISE CLEANED TO REMOVE THE CONTAMINANT, THE EMPLOYER SHALL INFORM THE PERSON PERFORMING THE CLEANING OPERATION OF THE HAZARDOUS PROPERTIES OF THE SUBSTANCE.

-- ----
ACGIH "GUIDELINES FOR THE SELECTION OF CHEMICAL PROTECTIVE CLOTHING" INDICATED THE FOLLOWING PROTECTIVE RATINGS FOR MATERIALS COMMONLY USED FOR PROTECTIVE CLOTHING. THESE RATINGS ARE BASED PRIMARILY ON QUANTITATIVE TEST RESULTS AND QUALITATIVE RESISTANCE INFORMATION. (THE RECOMMENDATIONS APPLY TO THE PURE SUBSTANCE ONLY; BREAKTHROUGH-TIME MAY VARY FOR MIXTURES.) (A "+" DESIGNATES A BLEND OF MATERIALS, WHILE A "/" DESIGNATES A COATED OR LAMINATED MATERIAL.)
-- ----

ETHYL BENZENE:
EXCELLENT/GOOD:
NONE INDICATED

GOOD/FAIR:
VITON/NEOPRENE
TEFLON

POOR/FAIR:
NEOPRENE
POLYVINYL ALCOHOL
POLYVINYL CHLORIDE
BUTYL/NEOPRENE

POOR:
NONE INDICATED

EYE PROTECTION
FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES FOR CHEMICAL HAZARDS":

EMPLOYERS SHALL PROVIDE AND ENSURE THAT EMPLOYEES USE SPLASH-PROOF SAFETY GOGGLES WHICH COMPLY WITH 29CFR1910.133(A)(2)-(A)(6) WHERE THIS LIQUID MAY CONTACT THE EYES.

WASHING CHEMICALS FROM THE SKIN
FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES FOR CHEMICAL HAZARDS":

EMPLOYERS SHALL ENSURE THAT EMPLOYEES WHOSE SKIN BECOMES CONTAMINATED WITH THIS SUBSTANCE PROMPTLY WASH OR SHOWER TO REMOVE ANY CONTAMINANT FROM THE SKIN.

ROUTINE CHANGING OF WORK CLOTHING
NO SPECIFIC REQUIREMENT. IF INDICATED BY THE NATURE OF THE CONTAMINANT AND THE EXTENT OF EXPOSURE, CHANGE INTO UNCONTAMINATED CLOTHING BEFORE LEAVING THE WORK PREMISES.

CLOTHING REMOVAL FOLLOWING ACCIDENTAL CONTAMINATION

FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES
FOR CHEMICAL HAZARDS":

EMPLOYERS SHALL ENSURE THAT NON-IMPERVIOUS CLOTHING WHICH BECOMES
CONTAMINATED WITH THIS SUBSTANCE BE REMOVED PROMPTLY AND NOT REWORN
UNTIL THE SUBSTANCE IS REMOVED FROM THE CLOTHING.
EMPLOYERS SHALL ENSURE THAT ANY CLOTHING WHICH BECOMES WET WITH THIS
FLAMMABLE LIQUID BE REMOVED IMMEDIATELY AND NOT REWORN UNTIL THE
SUBSTANCE IS REMOVED FROM THE CLOTHING.

SPECIFIC EMERGENCY PROVISIONS

NO SPECIFIC REQUIREMENT. IF INDICATED BY THE NATURE OF THE SUBSTANCE
AND THE PROBABILITY OF EXPOSURE, PROVIDE AN EYE WASH AND FACILITIES FOR
QUICK DRENCHING OF THE BODY WITHIN THE IMMEDIATE WORK AREA FOR
EMERGENCY USE.

RESPIRATOR SELECTION

1000 PPM

- POWERED AIR-PURIFYING RESPIRATOR WITH AN ORGANIC VAPOR CARTRIDGE
- SUPPLIED-AIR RESPIRATOR
- SELF-CONTAINED BREATHING APPARATUS
- CHEMICAL CARTRIDGE RESPIRATOR WITH AN ORGANIC VAPOR CARTRIDGE

2000 PPM

- GAS MASK WITH AN ORGANIC VAPOR CANISTER (CHIN-STYLE OR FRONT- OR
BACK-MOUNTED CANISTER)
- SUPPLIED-AIR RESPIRATOR
WITH A FULL FACE-PIECE
- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE-PIECE

ESCAPE

- GAS MASK WITH AN ORGANIC VAPOR CANISTER (CHIN-STYLE OR FRONT- OR
BACK-MOUNTED CANISTER)
- APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS

FIREFIGHTING

- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE-PIECE OPERATED IN
PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE
- SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN
PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE WITH AUXILIARY
SELF-CONTAINED BREATHING APPARATUS OPERATED IN POSITIVE PRESSURE
MODE

STATUS OF REGULATORY ENFORCEMENT

FEDERAL REGULATIONS

29CFR1910.1200 OSHA HAZARD COMMUNICATION STANDARD

REQUIRES CHEMICAL MANUFACTURERS AND IMPORTERS TO ASSESS THE HAZARDS OF

CHEMICALS WHICH THEY PRODUCE OR IMPORT, AND ALL EMPLOYERS TO PROVIDE INFORMATION TO THEIR EMPLOYEES CONCERNING HAZARDOUS CHEMICALS BY MEANS OF A HAZARD COMMUNICATION PROGRAM, LABELS AND OTHER FORMS OF WARNING, MATERIAL SAFETY DATA SHEETS, AND INFORMATION AND TRAINING. REQUIRES DISTRIBUTORS TO TRANSMIT REQUIRED INFORMATION TO EMPLOYEES.

OSHA STANDARD 29CFR1910.1000 AIR CONTAMINANTS
TABLE Z-1

OSHA STANDARD 29CFR1910.106 FLAMMABLE AND COMBUSTIBLE LIQUIDS
APPLIES TO THE HANDLING, STORAGE, AND USE OF FLAMMABLE AND COMBUSTIBLE LIQUIDS WITH A FLASH POINT BELOW 200 F

OSHA STANDARD 29CFR1910.94 VENTILATION

OSHA STANDARD 29CFR1910.134 RESPIRATORY PROTECTION

OSHA STANDARD 29CFR1910.20 ACCESS TO EMPLOYEE EXPOSURE AND MEDICAL RECORDS

OSHA STANDARD 29CFR1910.132 PERSONAL PROTECTIVE EQUIPMENT

OSHA STANDARD 29CFR1910.141 SANITATION

OSHA STANDARD 29CFR1910.151 MEDICAL SERVICES AND FIRST AID

OSHA STANDARD 29CFR1910.133 EYE AND FACE PROTECTION

29CFR1910.1450 SUBJECT TO OSHA STANDARD REGULATING OCCUPATIONAL EXPOSURE TO HAZARDOUS CHEMICALS IN LABORATORIES.
EFFECTIVE DATE: 5/1/90
55FR3300 1/31/90

40CFR60 STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES
SUBPART VV - STANDARDS OF PERFORMANCE FOR EQUIPMENT LEAKS OF VOLATILE ORGANIC COMPOUNDS IN THE SYNTHETIC ORGANIC CHEMICALS MANUFACTURING INDUSTRY

40CFR117 DETERMINATION OF REPORTABLE QUANTITIES FOR HAZARDOUS SUBSTANCES
QUANTITIES, AS LISTED IN TABLE 302.4 40CFR302, THAT MAY BE HARMFUL AND WHICH THE DISCHARGE IS A VIOLATION OF THE CLEAN WATER ACT SECTION 311(B)(3) AND REQUIRES NOTICE AS SET FORTH IN SECTIONS 103(A) AND 103(B) OF CERCLA.

40CFR401.15 GENERAL PROVISIONS
SUBCHAPTER M - EFFLUENT GUIDELINES AND STANDARDS
THIS SUBSTANCE LISTED AS A TOXIC POLLUTANT DESIGNATED PURSUANT TO SECTION 307(A)(1) OF THE CLEAN WATER ACT

40CFR122 EPA ADMINISTERED PERMIT PROGRAMS: THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
APPENDIX D - NPDES PERMIT APPLICATION TESTING REQUIREMENTS
TABLE 11 - ORGANIC TOXIC POLLUTANTS IN EACH OF FOUR FRACTIONS IN ANALYSIS BY GAS CHROMATOGRAPHY/MASS SPECTROSCOPY (GS/MS)

40CFR141.40 NATIONAL PRIMARY DRINKING WATER REGULATIONS
SPECIAL MONITORING FOR ORGANIC CHEMICALS

40CFR261 IDENTIFICATION AND LISTING OF HAZARDOUS WASTES

40CFR268 LAND DISPOSAL RESTRICTIONS

40CFR148 HAZARDOUS WASTE INJECTION RESTRICTIONS.

53FR28118 7/26/88
53FR30908 8/16/88
54FR25416 6/14/89
54FR26594 6/23/89

40CFR302 CERCLA SECTION 103 DESIGNATION, REPORTABLE QUANTITIES AND
NOTIFICATION
REPORTABLE QUANTITY (RQ) : 1000 LBS. (454 KG)

40CFR370 SARA TITLE III SECTION 311 HAZARDOUS CHEMICAL REPORTING:
COMMUNITY RIGHT-TO-KNOW
SUBPART B - REPORTING REQUIREMENTS

REPORTING THRESHOLD: 10,000 LBS. (4540 KG)

HAZARD CATEGORIES:

ACUTE HAZARD

FIRE HAZARD

40CFR372 SARA TITLE III SECTION 313 TOXIC CHEMICAL RELEASE REPORTING:
COMMUNITY RIGHT-TO-KNOW

SUBSTANCE LISTED TOXIC SUBSTANCES CONTROL ACT INVENTORY

40CFR717 RECORDS AND REPORTS OF ALLEGATIONS THAT CHEMICAL SUBSTANCES
CAUSE SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT
SECTION 8(C) OF THE TOXIC SUBSTANCES CONTROL ACT (TSCA) REQUIRES
MANUFACTURERS, PROCESSORS, AND DISTRIBUTORS OF CHEMICAL SUBSTANCES
AND MIXTURES TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO
HEALTH OR THE ENVIRONMENT ALLEGED TO HAVE BEEN CAUSED BY THE SUBSTANCE
OR MIXTURE. EPA MAY INSPECT AND REQUIRE REPORTING OF SUCH RECORDS.

TOXIC SUBSTANCE CONTROL ACT (TSCA) SECTION 8(E) INITIAL
EVALUATION OF SUBSTANTIAL RISK SUBMITTED TO EPA, 1982

40CFR716 THIS SUBSTANCE LISTED IN THE HEALTH AND SAFETY DATA
REPORTING RULE UNDER SECTION 8(D) OF THE TOXIC SUBSTANCES CONTROL ACT
(TSCA) REQUIRING PAST, CURRENT AND PROSPECTIVE MANUFACTURERS, IMPORTERS
AND PROCESSORS TO SUBMIT TO THE ENVIRONMENTAL PROTECTION AGENCY (EPA)
COPIES AND LISTS OF UNPUBLISHED HEALTH AND SAFETY STUDIES ON THE LISTED
CHEMICALS THAT THEY MANUFACTURE, IMPORT OR PROCESS.
56FR42688

THIS SUBSTANCE TESTED FOR EPIDEMIOLOGY BY THE ENVIRONMENTAL
PROTECTION AGENCY (EPA)

49CFR172.101 TABLES OF HAZARDOUS MATERIALS, THEIR DESCRIPTION, PROPER
SHIPPING NAME, CLASS, LABEL, PACKAGING, AND OTHER REQUIREMENTS
DESIGNATED IN HAZARDOUS MATERIALS TABLES AS HAZARDOUS MATERIAL FOR
THE PURPOSE OF TRANSPORTATION.

46CFR30.25 COMMODITIES REGULATED BY THE COAST GUARD
SUBSTANCE LISTED UNDER FLAMMABLE AND COMBUSTIBLE BULK LIQUID CARGOES

33CFR160.211 AND 213 U.S. COAST GUARD REQUIRES 24 HOURS ADVANCE NOTICE TO CAPTAIN OF THE PORT WHEN THIS SUBSTANCE IS SCHEDULED TO ARRIVE AT OR DEPART FROM PORT.

INTERNATIONAL REGULATIONS

SUBSTANCE LISTED UNDER THE STATE OF CALIFORNIA HAZARDOUS SUBSTANCES INFORMATION AND TRAINING ACT, CALIFORNIA LABOR CODE, DIVISION 5, CHAPTER 2.5

SUBSTANCE LISTED BY THE NEW JERSEY WORKER AND COMMUNITY RIGHT TO KNOW ACT, P.L. 1983, CHAPTER 315, N.J.S.A. 34: A-1. EMPLOYERS COVERED: SIC CODES 20-39, 46-49, 51, 75, 76, 80, 82, AND 84.

SUBSTANCE LISTED UNDER THE STATE OF FLORIDA TOXIC SUBSTANCES IN THE WORKPLACE RIGHT TO KNOW LAW, CHAPTER 442 OF THE FLORIDA STATUTES.

SUBSTANCE LISTED UNDER THE STATE OF PENNSYLVANIA WORKER AND COMMUNITY RIGHT TO KNOW ACT, P.L. 734, NO. 159.

INTERNATIONAL REGULATIONS

INTERNATIONAL MARITIME ORGANIZATION (IMO) - DANGEROUS GOODS CODE SUBSTANCE SPECIFICALLY REGULATED FOR INTERNATIONAL SHIPMENTS

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA) - TABLE 4.2 DANGEROUS GOODS LIST: THEIR DESCRIPTION, PROPER SHIPPING NAME, CLASS, LABEL, PACKAGING AND OTHER REQUIREMENTS.

DESIGNATED AS A DANGEROUS GOOD FOR THE PURPOSE OF AIR TRANSPORTATION.

CANADA: THIS SUBSTANCE SUBJECT TO REQUIREMENTS OF CANADA'S WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS). THE REGULATIONS REQUIRE SUPPLIERS OF HAZARDOUS MATERIALS TO PROVIDE ADEQUATE LABELS AND MATERIAL SAFETY DATA SHEETS (MSDS'S) AS CONDITIONS OF SALE AND IMPORTATION. EMPLOYERS MUST PROVIDE LABELS, MSDS'S AND WORKER EDUCATION PROGRAMS IN THE WORKPLACE.

GERMANY (DFG): MAXIMUM CONCENTRATION VALUES IN THE WORKPLACE (MAK)

ETHYL BENZENE:
100 PPM (440 MG/M3) DFG MAK TWA
200 PPM (880 MG/M3) DFG MAK 5 MINUTE PEAK,
MOMENTARY VALUE, 8 TIMES/SHIFT

ADDITIONAL INFORMATION

CERCLA SECTION 104(1) PRIORITY LIST OF HAZARDOUS SUBSTANCES FOUND AT SUPERFUND SITES.

| | |
|-----------|----------|
| 52FR12866 | 4/17/87 |
| 53FR41280 | 10/20/88 |
| 54FR43615 | 10/26/89 |
| 55FR42067 | 10/17/90 |

TWO YEAR STUDIES: HISTOPATHOLOGY IN PROGRESS BY THE NATIONAL

TOXICOLOGY PROGRAM (NTP).

CHEMICAL ASSIGNED TO LABORATORY FOR TOXICOLOGY STUDY BY THE NATIONAL TOXICOLOGY PROGRAM (NTP).

THIS SUBSTANCE TESTED FOR CARCINOGENESIS BY THE NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES (NIEHS)

NATIONAL TOXICOLOGY PROGRAM (NTP) TECHNICAL REPORT AVAILABLE ON THIS SUBSTANCE.

SHORT TERM TOXICITY STUDIES SCHEDULED FOR PEER REVIEW BY THE NATIONAL TOXICOLOGY PROGRAM (NTP).

NATIONAL TOXICOLOGY PROGRAM (NTP) TECHNICAL REPORT AVAILABLE ON THIS SUBSTANCE.

TRANSPORTATION

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
ETHYLBENZENE-UN 1175

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
3 - FLAMMABLE LIQUID

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG 11

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
FLAMMABLE LIQUID

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:

EXCEPTIONS: 49 CFR 173.150

NON-BULK PACKAGING: 49 CFR 173.202

BULK PACKAGING: 49 CFR 173.242

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 5 L
CARGO AIRCRAFT ONLY: 60 L

LEAK AND SPILL PROCEDURES

REPORTABLE QUANTITY (RQ) 1000 LB. (454 KG)
A REPORTABLE QUANTITY OF ONE THOUSAND POUNDS APPLIES TO THIS SUBSTANCE ESTABLISHED BY SECTIONS 101(14) AND 102(B) OR ADJUSTED UNDER SECTION 102(A) OF THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT OF 1980 (CERCLA). SECTIONS 103(A) AND 103(B) REQUIRE THAT PERSONS IN CHARGE OF A VESSEL OF FACILITY FROM WHICH A HAZARDOUS SUBSTANCE HAS BEEN RELEASED IN A QUANTITY EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THAT SUBSTANCE IMMEDIATELY NOTIFY THE NATIONAL RESPONSE CENTER (800) 424-8802; IN THE WASHINGTON, D.C. METROPOLITAN AREA (202) 426-2675.
40CFR302

FOLLOWING INFORMATION RECOMMENDED FOR THE EMERGENCY HANDLING OF
HAZARDOUS MATERIALS INVOLVED IN A LEAK OR SPILL INCIDENT:

IF MATERIAL ON FIRE OR INVOLVED IN FIRE:

- * EXTINGUISH FIRE ONLY IF FLOW CAN BE STOPPED
- * APPLY FLOODING QUANTITIES OF WATER AS FOG
- * SOLID STREAM OF WATER MAY SPREAD FIRE
- * USE FLOODING QUANTITIES OF WATER TO COOL ALL AFFECTED CONTAINERS
- * WATER SHOULD BE APPLIED FROM AS FAR A DISTANCE AS POSSIBLE
- * USE ALCOHOL FOAM OR CO2 OR DRY CHEMICAL EXTINGUISHERS

IF MATERIAL IS NOT ON FIRE AND IS NOT INVOLVED IN FIRE:

- * KEEP AWAY FROM SPARKS, FLAMES AND OTHER SOURCES OF IGNITION
- * DO NOT ALLOW MATERIAL TO CONTAMINATE WATER SOURCES AND SEWERS
- * CONTAIN FLOW WITH DIKES AS NECESSARY
- * ATTEMPT TO STOP LEAK IF WITHOUT HAZARD
- * CONTROL VAPORS WITH WATER SPRAY

PERSONNEL PROTECTION:

- * AVOID BREATHING DUST/VAPORS/FUMES FROM MATERIAL
- * KEEP UPWIND
- * WEAR BOOTS, PROTECTIVE GLOVES AND GAS TIGHT GOGGLES
- * DO NOT HANDLE BROKEN PACKAGES WITHOUT PROTECTIVE EQUIPMENT
- * WASH CONTAMINATED SKIN WITH COPIOUS AMOUNTS OF WATER OR SOAP AND WATER

LAND SPILL:

- * DIG A HOLDING AREA SUCH AS A PIT, POND, OR LAGOON TO CONTAIN LIQUID OR SOLID MATERIAL
- * DIKE FLOW OF SPILLED MATERIAL USING SOIL OR SANDBAGS OR FOAMED BARRIERS SUCH AS POLYURETHANE OR CONCRETE
- * USE CEMENT POWDER OR FLY ASH TO ABSORB LIQUID MASS
- * IMMOBILIZE SPILL WITH UNIVERSAL GELLING AGENT
- * REDUCE VAPOR AND FIRE HAZARD WITH FLUOROCARBON WATER FOAM

WATER SPILL:

- * LIMIT SPILL MOTION WITH NATURAL BARRIERS OR OIL SPILL CONTROL BOOMS
- * USE SURFACE ACTIVE AGENT, DETERGENTS, SOAPS, ALCOHOLS TO COMPRESS AND THICKEN SPILLED MATERIAL
- * USE UNIVERSAL GELLING AGENT TO SOLIDIFY ENCIRCLED SPILL AND INCREASE EFFECTIVENESS OF BOOMS
- * IF DISSOLVED, APPLY ACTIVATED CARBON AT 10 TIMES SPILLED AMOUNT IN THE REGION OF 10 PPM OR GREATER CONCENTRATION
- * USE SUCTION HOSES TO REMOVE TRAPPED MATERIAL
- * REMOVE IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES WITH MECHANICAL DREDGES OR LIFTS

AIR SPILL:

- * KNOCK DOWN VAPORS WITH WATER SPRAY

FOLLOWING INFORMATION FROM DEPARTMENT OF TRANSPORTATION/U.S. COAST GUARD
"CHEMICAL RESPONSE INFORMATION SYSTEM", REGARDING WATER SPILLS:

- * SUBSTANCE FLOATS ON WATER
- * RESTRICT ACCESS OF GENERAL PUBLIC WHEN APPRECIABLE DANGER ARISES FROM SPILL
- * RESTRICT IGNITION SOURCES WHEN SUBSTANCE INVOLVED

- * RESTRICT HUMAN USE WHEN SUBSTANCE INVOLVED
- * CONTAIN SURFACE SLICKS
- * SKIM SURFACE SLICK
- * HIGHLY VOLATILE, AVOID INHALATION, VAPORS OR DUST ARE IRRITATING OR TOXIC
- * HIGHLY CORROSIVE, AVOID DIRECT CONTACT, CONTACT WITH SKIN OR EYES CAN CAUSE IRRITATION OR BURNS
- * FIRST ATTEMPT TO CONTAIN AND SKIM, DILUTE AND DISPERSE WHAT HAS DISSOLVED IN WATER
- * LISTED BY U.S. COAST GUARD UNDER CARGO COMPATIBILITY GROUP AROMATIC HYDROCARBONS, INCOMPATIBLE WITH NITRIC ACID

OCCUPATIONAL SPILL:
 SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING OR FLAMES IN HAZARD AREA.
 STOP LEAK IF YOU CAN DO IT WITHOUT RISK. WATER SPRAY MAY REDUCE VAPOR,
 BUT IT MAY NOT PREVENT IGNITION IN CLOSED SPACES. FOR SMALL SPILLS, TAKE
 UP WITH SAND OR OTHER NONCOMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO
 CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF
 LIQUID SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY; ISOLATE
 HAZARD AREA AND DENY ENTRY.

WASTE DISPOSAL

 OBSERVE ALL FEDERAL, STATE OR LOCAL REGULATIONS WHEN STORING OR
 DISPOSING OF THIS SUBSTANCE. CONTACT LOCAL AND/OR STATE ENVIRONMENTAL
 AUTHORITIES TO INSURE PROPER COMPLIANCE.

 THIS SUBSTANCE MEETS THE DEFINITION OF A HAZARDOUS WASTE AS DEFINED BY
 THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) (40CFR260) AND IS
 SUBJECT TO THE FOLLOWING CONSIDERATIONS:

40CFR260 HAZARDOUS WASTE MANAGEMENT SYSTEM: GENERAL

PROVIDES DEFINITIONS OF TERMS, GENERAL STANDARDS, AND OVERVIEW
 INFORMATION APPLICABLE TO 40CFR PARTS 260-265

40CFR261 IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

IDENTIFIES THOSE SOLID WASTES WHICH ARE SUBJECT TO REGULATION AS
 HAZARDOUS WASTES UNDER 40CFR PARTS 262-265, 270, 271, AND 124 AND WHICH
 ARE SUBJECT TO THE NOTIFICATION REQUIREMENTS OF SECTION 3010 OF THE
 RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) AND IDENTIFIES ONLY SOME
 OF THE MATERIALS WHICH ARE HAZARDOUS WASTES UNDER SECTIONS 3007 AND 7003
 OF RCRA

THIS COMPOUND, DEPENDING ON THE CHARACTERISTIC, CONCENTRATION
 AND/OR SOURCE OF THE WASTE, MAY BE REGULATED UNDER THE FOLLOW-
 ING WASTE NUMBER(S) AND, IN TURN, SUBJECT TO THE CORRESPONDING
 REPORTABLE QUANTITY (RQ) (IF APPLICABLE):

40CFR261.32 HAZARDOUS WASTES FROM SPECIFIC SOURCES
EPA HAZARDOUS WASTE NO. K052: TANK BOTTOMS (LEADED) FROM THE PETROLEUM REFINING INDUSTRY. (T)

REPORTABLE QUANTITY (RQ) : 10 LBS.
A REPORTABLE QUANTITY OF 10 LBS. APPLIES TO THIS HAZARDOUS WASTE FROM NON-SPECIFIC SOURCES ADJUSTED UNDER SECTION 102(A) OF THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT (CERCLA) OF 1980 IDENTIFIED IN 40CFR261.31. SECTIONS 103(A) AND 103(B) REQUIRE THAT PERSONS IN CHARGE OF A VESSEL OR FACILITY FROM WHICH A HAZARDOUS SUBSTANCE HAS BEEN RELEASED IN A QUANTITY EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY IMMEDIATELY NOTIFY THE NATIONAL RESPONSE CENTER AT (800) 424-8802; OR IN THE METROPOLITAN WASHINGTON, D.C. AREA (202) 426-2675.

40CFR261.32 HAZARDOUS WASTES FROM SPECIFIC SOURCES
EPA HAZARDOUS WASTE NO. K086: SOLVENT WASHES AND SLUDGES, CAUSTIC WASHES AND SLUDGES, OR WATER WASHES AND SLUDGES FROM CLEANING TUBS AND EQUIPMENT USED IN THE FORMULATION OF INK FROM PIGMENTS, DRIERS, SOAPS AND STABILIZERS CONTAINING CHROMIUM AND LEAD. (T)

40CFR261.32 HAZARDOUS WASTE FROM SPECIFIC SOURCES
EPA HAZARDOUS WASTE NO. K048: DISSOLVED AIR FLOTATION (DAF) FLOAT FROM PETROLEUM REFINING INDUSTRY. (T)

40CFR261.32 HAZARDOUS WASTES FROM SPECIFIC SOURCES
EPA HAZARDOUS WASTE NO. K049: SLOP OIL EMULSION SOLIDS FROM PETROLEUM REFINING INDUSTRY. (T)

40CFR261.32 HAZARDOUS WASTE FROM SPECIFIC SOURCES
EPA HAZARDOUS WASTE NO. K051: API SEPARATOR SLUDGE FROM THE PETROLEUM REFINING INDUSTRY. (T)

40CFR261.32 HAZARDOUS WASTES FROM SPECIFIC SOURCES
EPA HAZARDOUS WASTE NO. K052: TANK BOTTOMS (LEADED) FROM THE PETROLEUM REFINING INDUSTRY. (T)

40CFR261.21 CHARACTERISTIC OF IGNITABILITY

EPA HAZARDOUS WASTE NUMBER D001

REPORTABLE QUANTITY (RQ) : 100 LBS.

A REPORTABLE QUANTITY OF 100 LBS. APPLIES TO THIS WASTE ADJUSTED UNDER SECTION 102(A) OF THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT OF 1980 (CERCLA) BY EXHIBITING ONE OR MORE OF THE CHARACTERISTICS OF IGNITABILITY, CORROSIVITY OR REACTIVITY IDENTIFIED IN 40CFR261.21 THROUGH 261.23. SECTIONS 103(A) AND 103(B) REQUIRE THAT PERSONS IN CHARGE OF A VESSEL OR FACILITY FROM WHICH A HAZARDOUS SUBSTANCE HAS BEEN RELEASED IN A QUANTITY EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY IMMEDIATELY NOTIFY THE NATIONAL RESPONSE CENTER (800) 424-8802; IN WASHINGTON, D.C. METROPOLITAN AREA (202) 426-2675.
50FR13456 4/4/85

40CFR262 STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE

ESTABLISHES STANDARDS FOR GENERATORS OF HAZARDOUS WASTE

40CFR263 STANDARDS APPLICABLE TO TRANSPORTERS OF HAZARDOUS WASTE

ESTABLISHES STANDARDS WHICH APPLY TO PERSONS TRANSPORTING HAZARDOUS WASTE WITHIN THE UNITED STATES IF THE TRANSPORTATION REQUIRES A MANIFEST UNDER 40CFR262

40CFR264 STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE
TREATMENT, STORAGE, AND DISPOSAL FACILITIES

ESTABLISHES MINIMUM NATIONAL STANDARDS WHICH DEFINE THE ACCEPTABLE
MANAGEMENT OF HAZARDOUS WASTE

40CFR265 INTERIM STATUS STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS
WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

ESTABLISHES MINIMUM NATIONAL STANDARDS WHICH DEFINE THE ACCEPTABLE
MANAGEMENT OF HAZARDOUS WASTE DURING THE PERIOD OF INTERIM STATUS

40CFR267 INTERIM STANDARDS FOR OWNERS AND OPERATORS OF NEW HAZARDOUS
WASTE LAND DISPOSAL FACILITIES

ESTABLISHES MINIMUM NATIONAL STANDARDS THAT DEFINE THE ACCEPTABLE
MANAGEMENT OF HAZARDOUS WASTE FOR NEW LAND DISPOSAL FACILITIES

40CFR268 LAND DISPOSAL RESTRICTIONS

IDENTIFIES HAZARDOUS WASTES THAT ARE RESTRICTED FROM LAND DISPOSAL
AND DEFINES THOSE LIMITED CIRCUMSTANCES UNDER WHICH AN OTHERWISE
PROHIBITED WASTE MAY CONTINUE TO BE LAND DISPOSED.

40CFR268.35 WASTE SPECIFIC PROHIBITIONS - THIRD THIRD WASTES
55FR22520 6/1/90

40CFR148 HAZARDOUS WASTE INJECTION RESTRICTIONS

IDENTIFIES HAZARDOUS WASTES THAT ARE RESTRICTED FROM DISPOSAL INTO
CLASS I HAZARDOUS WASTE INJECTION WELLS AND DEFINES THOSE CIRCUMSTANCES
UNDER WHICH A WASTE, OTHERWISE PROHIBITED FROM INJECTION, MAY BE
INJECTED.

53FR28118 7/26/88
53FR30908 8/16/88
54FR25416 6/14/89
54FR26594 6/23/89

40CFR148.16 WASTE SPECIFIC PROHIBITIONS - THIRD THIRD WASTES

40CFR270 EPA ADMINISTERED PERMIT PROGRAMS: THE HAZARDOUS WASTE PERMIT
PROGRAM

ESTABLISHES PROVISIONS FOR THE HAZARDOUS WASTE PERMIT PROGRAM UNDER
SUBTITLE C OF THE SOLID WASTE DISPOSAL ACT, AS AMENDED BY THE RESOURCE
CONSERVATION AND RECOVERY ACT

40CFR271 REQUIREMENT FOR AUTHORIZATION OF STATE HAZARDOUS WASTE
PROGRAMS

SPECIFIES THE PROCEDURES EPA WILL FOLLOW IN APPROVING, REVISING, AND
WITHDRAWING APPROVAL OF STATE PROGRAMS AND THE REQUIREMENTS STATE
PROGRAMS MUST MEET TO BE APPROVED BY THE ADMINISTRATION UNDER SECTION
3006(8) OF RCRA

5.2 Chemical Hazard Information

Onsite personnel may be exposed to chemical hazards while observing or participating in surface soil sampling. There is potential for dermal contact of the constituents outlined below.

Diesel Fuel Oil and Heating Oil: Diesel Fuel Oil is a complex petroleum mixture of paraffinic, olefinic, naphthenic, and aromatic hydrocarbons. The benzene content is typically less than 100 ppm in the source product. Excessive inhalation exposure may cause respiratory irritation, headache, dizziness, nausea, vomiting, and loss of coordination. Prolonged skin contact may lead to irritation of hair follicles and blockage of the sebaceous glands. Good personal hygiene will prevent this. There is no OSHA permissible exposure limit for diesel Fuel Oil.

Gasoline: Gasoline is a variable mixture of paraffins, aromatics, and olefins. Acute toxicity includes anesthetic effects and mucus membrane irritation. Symptoms of acute exposure include headache, blurred vision, dizziness, and nausea. The major toxicity concern is benzene, a known human carcinogen through inhalation. Gasoline typically contains 0.7 to 1.0 percent benzene. The OSHA time weighted average (TWA) for benzene is currently 1 ppm.

Gasoline also contains lead, which has adverse health effects if inhaled. The OSHA TWA for lead is 50 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$); however, lead is not readily volatilized. The overall threshold limit value (TLV) for gasoline is 300 ppm, based largely upon assumptions about the hydrocarbon content of gasoline.

Skin contact with gasoline can produce immediate or delayed symptoms of dryness or irritation. If skin comes in contact with gasoline, remove clothing from affected skin area and wash promptly with soap and water. Dry the skin carefully with a clean towel. If skin is inflamed, painful or blistered, seek medical attention. If ingestion occurs, do not induce vomiting. Get medical help. Be prepared to administer artificial respiration.

Kerosene: Kerosene is a refined petroleum distillate consisting primarily of C10 to C16 hydrocarbons. It is a variable mixture of paraffins, naphthenes, olefins, and aromatics. The vapor pressure at 20°C is approximately 5 millimeters (mm) mercury (Hg). There is no OSHA permissible exposure level (PEL), but the National Institute of Occupational Safety and Health (NIOSH) recommends an exposure limit (REL) of 100 milligrams per cubic meter (mg/m^3). (This is approximately 14 ppm.) Overexposure may cause headaches, dizziness, nausea, stupor, and respiratory tract and eye irritation. The primary health hazard is skin irritation and dermatitis from prolonged or repeated skin contact. Ingestion can be irritating to the mouth, throat, and digestive tract with the hazard of aspiration into the lungs.

Baxter Healthcare Corporation
Burdick & Jackson Division
1953 South Harvey Street
Muskegon, MI 49442 USA

information/emergency telephone no. 616.726.3171
chemtrec telephone no. 800.424.9300
canadian emergency telephone no. 613.996.6666

**MATERIAL SAFETY
DATA SHEET****HEXANE****I. Identification**

chemical name Hexane molecular weight 86.18
chemical family Aliphatic Hydrocarbon formula C₆H₁₄
synonyms n-Hexane
DOT proper shipping name Hexane
DOT hazard class Flammable Liquid
DOT identification no. UN1208 CAS no. 110-54-3

II. Physical and Chemical Data

boiling point, 760mm Hg. 68.7°C freezing point -95.3°C evaporation rate (BuAc=1) ca 10
vapor pressure at 20°C 124 mm Hg vapor density (air=1) 3.0 solubility in water @ 20°C 0.014%
% volatiles by volume ca 100 specific gravity (H₂O=1) @ 20°C 0.659 stability Stable
hazardous polymerization Not expected to occur.
appearance and odor Clear, colorless liquid with a mild hydrocarbon odor.
conditions to avoid Heat, sparks, open flame, open containers, and poor ventilation.

materials to avoid Strong oxidizing agents.

hazardous decomposition products Incomplete combustion can generate carbon monoxide and other toxic vapors.

III. Fire and Explosion Hazard Data

flash point, (test method) -26°C (Tag closed cup) auto ignition temperature 225°C
flammable limits in air % by volume: lower limit 1.1 upper limit 7.5
unusual fire and explosion hazards Very volatile and extremely flammable.

extinguishing media Carbon dioxide, dry chemical or foam.

special fire fighting procedures Water will not be effective in extinguishing a fire and may spread it, but a water spray can be used to cool exposed containers. Wear full protective clothing and self-contained breathing apparatus.
Heat will build pressure and may rupture closed storage containers.

IV. Hazardous Components

Hexane and isomers % ca 100 TLV 50 ppm CAS no. 110-54-3

Burdick & Jackson's Disclaimer: The information and recommendations presented in this Material Safety Data Sheet are based on sources believed to be reliable on the date hereof. Burdick & Jackson makes no representation on its completeness or accuracy. It is the user's responsibility to determine the product's suitability for its intended use, the product's safe use, and the product's proper disposal. No representations or warranties, either express or implied, of merchantability or fitness for a particular purpose or of any other nature are made with respect to the information provided in this Material Safety Data Sheet or to the product to which such information refers. Burdick & Jackson neither assumes nor authorizes any other person to assume for it, any other or additional liability or responsibility resulting from the use of, or reliance upon, this information.

V. Health Hazards

Occupational Exposure Limits

OSHA TWA - 50 ppm
 STEL - not listed
 Ceiling - not listed

ACGIH TLV-TWA - 50 ppm
 TLV-STEL - not listed
 (15-min)

NIOSH 10 hour TWA - 100 ppm
 15 min Ceiling - 510 ppm

Concentration Immediately Dangerous to Health

OSHA/NIOSH 5,000 ppm

Odor Threshold

NSC not listed
NIOSH not listed

Carcinogenic Data

Hexane is not listed as a carcinogen by IARC, NTP, OSHA, or ACGIH.

Primary Routes of Entry

Hexane may exert its effects through inhalation, skin absorption, and ingestion.

Industrial Exposure: Route of Exposure/Signs and Symptoms

Inhalation: Exposure can cause dizziness, numbness of extremities, and intoxication.

Eye Contact: Liquid and high vapor concentration can be irritating.

Skin Contact: Prolonged or repeated skin contact can cause irritation and dermatitis through defatting of skin.

Ingestion: Can cause gastrointestinal tract discomfort.

Effects of Overexposure

Hexane is a mild eye and mucous membrane irritant, primary skin irritant, central nervous system depressant and neurotoxin. Acute exposure causes irritation, narcosis, and gastrointestinal tract irritation. Chronic inhalation causes peripheral neuropathy. No systemic toxicity has been reported.

Medical Condition Aggravated by Exposure

Preclude from exposure those individuals susceptible to dermatitis.

Emergency First Aid

- Inhalation:** Immediately remove to fresh air. If not breathing, administer mouth-to-mouth rescue breathing. If there is no pulse administer cardiopulmonary resuscitation (CPR). Contact physician immediately.
- Eye Contact:** Rinse with copious amounts of water for at least 15 minutes. Get emergency medical assistance.
- Skin Contact:** Flush thoroughly for at least 15 minutes. Wash affected skin with soap and water. Remove contaminated clothing and shoes. Wash clothing before re-use, and discard contaminated shoes. Get emergency medical assistance.
- Ingestion:** Call local Poison Control Center for assistance. Contact physician immediately. Aspiration Hazard - Do not induce vomiting.

VI. Safety Measures and Equipment

- Ventilation:** Adequate ventilation is required to protect personnel from exposure to chemical vapors exceeding the PEL and to minimize fire hazards. The choice of ventilation equipment, either local or general, will depend on the conditions of use, quantity of material, and other operating parameters.
- Respiratory:** Use approved respirator equipment. Follow NIOSH and equipment manufacturer's recommendations to determine appropriate equipment (air-purifying, air-supplied, or self-contained breathing apparatus).
- Eyes:** Safety glasses are considered minimum protection. Goggles or face shield may be necessary depending on quantity of material and conditions of use.
- Skin:** Protective gloves and clothing are recommended. The choice of material must be based on chemical resistance and other user requirements. Generally, neoprene or nitrile rubber offer acceptable chemical resistance. Individuals who are acutely and specifically sensitive to hexane may require additional protective equipment.

Storage: Hexane should be protected from temperature extremes and direct sunlight. Proper storage of hexane must be determined based on other materials stored and their hazards and potential chemical incompatibility. In general, hexane should be stored in an acceptably protected and secure flammable liquid storage room.

Other: Emergency eye wash fountains and safety showers should be available in the vicinity of any potential exposure. Ground and bond metal containers to minimize static sparks.

VII. Spill and Disposal Data

Spill Control: Protect from ignition. Wear protective clothing and use approved respirator equipment. Absorb spilled material in an absorbent recommended for solvent spills and remove to a safe location for disposal by approved methods. If released to the environment, comply with all regulatory notification requirements.

Waste Disposal: Dispose of hexane as an EPA hazardous waste. Contact state environmental agency for listing of licensed hazardous waste disposal facilities and applicable regulations. Hazardous waste number: D001(Ignitable).

VIII. SARA/Title III Data

| <u>Hazard Classification</u> | | <u>Chemical Listings</u> | |
|------------------------------|----------------|--------------------------------|----|
| Immediate Health | Yes (irritant) | Extremely Hazardous Substances | No |
| Delayed Health | Yes | CERCLA Hazardous Substances | No |
| Fire | Yes | Toxic Chemicals | No |
| Sudden Release | No | | |
| Reactive | No | | |

Hexane is not subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40CFR Part 372. This product does not contain any other toxic chemical above 1% concentration or a carcinogen above 0.1% concentration.

Revision Date: July, 1989

KEY

| | | | |
|----|----------------|------|--|
| ca | Approximately | STEL | Short Term Exposure Level (15 minutes) |
| na | Not applicable | TLV | Threshold Limit Value |
| C | Ceiling | TWA | Time Weighted Average (8 hours) |
| | | BuAc | Butyl Acetate |

CERCLA Comprehensive Environmental Response, Compensation and Liability Act
NSC National Safety Council ("Fundamentals of Industrial Hygiene," 3rd. Ed., 1988)

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: 1-HEXENE

- * Wash thoroughly immediately after exposure to 1-Hexene.
- * Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of 1-Hexene to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

3.0 HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to 1-Hexene:

- * Exposure can cause you to feel dizzy, nauseous and to pass out.
- * Contact can irritate the skin and eyes.
- * Breathing 1-Hexene can irritate the nose and throat.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to 1-Hexene and can last for months or years:

Cancer Hazard

- * According to the information presently available to the New Jersey Department of Health, 1-Hexene has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

- * According to the information presently available to the New Jersey Department of Health, 1-Hexene has not been tested for its ability to adversely affect reproduction.

Other Long-Term Effects

- * 1-Hexene has not been tested for other long-term health effects.

MEDICAL

Medical Testing

There is no special test for this chemical. However, if illness occurs or overexposure is suspected, medical attention is recommended.

Any evaluation should include a careful history of past and

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: 1-HEXENE

present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, ENGINEERING CONTROLS are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

- * Where possible, automatically pump liquid 1-Hexene from drums or other storage containers to process containers.
- * Before entering a confined space where 1-Hexene may be present, check to make sure that an explosive concentration does not exist.

Good WORK PRACTICES can help to reduce hazardous exposures.

The following work practices are recommended:

- * Workers whose clothing has been contaminated by 1-Hexene should change into clean clothing promptly.
- * Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to 1-Hexene.
- * Eye wash fountains should be provided in the immediate work area for emergency use.
- * On skin contact with 1-Hexene, immediately wash or shower to remove the chemical.

4.0 PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: 1-HEXENE

Clothing

- * Avoid skin contact with 1-Hexene. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- * ACGIH recommends Neoprene, Nitrile Rubber, Polyurethane, Polyvinyl Alcohol, or Viton as protective materials.

Eye Protection

- * Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

- * Engineering controls must be effective to ensure that exposure to 1-Hexene does not occur.
- * Where the potential for high exposures exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode, or use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.

5.0 QUESTIONS AND ANSWERS

- Q: If I have acute health effects, will I later get chronic health effects?
- A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.
- Q: Can I get long-term effects without ever having short-term effects?
- A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.
- Q: What are my chances of getting sick when I have been exposed to chemicals?
- A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: 1-HEXENE

Q: When are higher exposures more likely?

A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

The following information is available from:

New Jersey Department of Health
Occupational Health Service Trenton, NJ 08625-0360 (609)
984-1863

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health physician who can help you find the services you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health,

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: 1-HEXENE

references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-5627.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

CAG is the Carcinogens Assessment Group of the federal EPA.

A carcinogen is a substance that causes cancer.

The CAS number is assigned by the Chemical Abstracts Service to identify a specific chemical.

A combustible substance is a solid, liquid or gas that will burn.

A corrosive substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A fetus is an unborn human or animal.

A flammable substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The flash point is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A miscible substance is a liquid or gas that will evenly dissolve in another.

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: 1-HEXENE

mg/m³ means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A mutagen is a substance that causes mutations. A mutation is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A reactive substance is a solid, liquid or gas that can cause an explosion under certain conditions or on contact with other specific substances.

A teratogen is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The vapor pressure is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

6.0 EMERGENCY INFORMATION

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: 1-HEXENE

Common Name: 1-HEXENE
 DOT Number: UN 2370
 DOT Emergency Guide code: 27
 CAS Number: 592-41-6

| Hazard rating | NJ DOH | NFPA |
|--|--------|------|
| FLAMMABILITY | - | 3 |
| REACTIVITY | - | 0 |
| POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE | | |

Hazard Rating Key: 0=minimal; 1=slight;
 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

- * 1-Hexene is a flammable liquid.
- * Use dry chemical, CO2, water spray, or foam extinguishers.
- * POISONOUS GAS IS PRODUCED IN FIRE.
- * CONTAINERS MAY EXPLODE IN FIRE.
- * Vapors may travel to a source of ignition and flash back.
- * If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPIILLS AND EMERGENCIES

- If 1-Hexene is spilled or leaked, take the following steps:
- * Restrict persons not wearing protective equipment from area of spill or leak until clean-up is complete.
 - * Remove all ignition sources.
 - * Ventilate area of spill or leak.
 - * Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
 - * Keep 1-Hexene out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
 - * It may be necessary to contain and dispose of 1-Hexene as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

FOR LARGE SPIILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: 1-HEXENE

NJDEP HOTLINE: (609) 292-7172 Other:

HANDLING AND STORAGE

- * Prior to working with 1-Hexene you should be trained on its proper handling and storage.
- * Store in tightly closed containers in a cool well-ventilated area away from STRONG OXIDIZERS such as CHLORINE, BROMINE, and FLUORINE.
- * Sources of ignition such as smoking and open flames are prohibited where 1-Hexene is handled, used, or stored.
- * Metal containers involving the transfer of 5 gallons or more of 1-Hexene should be grounded and bonded. Drums must be equipped with self-closing valves, pressure vacuum bungs, and flame arresters.
- * Use only non-sparking tools and equipment, especially when opening and closing containers of 1-Hexene.
- * Wherever 1-Hexene is used, handled, manufactured, or stored, use explosion-proof electrical equipment and fittings.

FIRST AID

In NJ, POISON INFORMATION 1-800-962-1253 Other:

Eye Contact

- * Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

- * Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Breathing

- * Remove the person from exposure.
- * Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
- * Transfer promptly to a medical facility.

PHYSICAL DATA

Vapor Pressure: 100 mm Hg at 55 degrees F (12.8 degrees C),
310 mm Hg at 100 degrees F (37.8 degrees C) Flash Point: -15
degrees F (-26.1 degrees C) Water Solubility: Insoluble

OTHER COMMONLY USED NAMES

Chemical Name:
1-Hexene

Other Names and Formulations:

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: 1-HEXENE

Hexylene; Butylethylene; Hexene; 1-n-Hexene

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH

Right to Know Program CN 368, Trenton, NJ 08625-0368 (609)
984-2202

Topic: HYDROCHLORIC ACID

VERVIEW

Material name:

HYDROCHLORIC ACID

Common synonyms:

Muriatic Acid

Characteristics:

Watery liquid Colorless Sharp, irritating odor

Sinks and mixes with water. Irritating vapor is produced.

Emergency actions:

AVOID CONTACT WITH LIQUID AND VAPOR. Keep people away.

Wear chemical protective suit with self-contained breathing apparatus.

Stop discharge if possible.

Stay upwind and use water spray to 'knock down' vapor.

Isolate and remove discharged material.

Notify local health and pollution control agencies.

Fire:

Not flammable.

Flammable gas may be produced on contact with metals.

Wear chemical protective suit with self-contained breathing apparatus.

Exposure:

CALL FOR MEDICAL AID.

VAPOR

Irritating to eyes, nose and throat.

If inhaled, will cause coughing or difficult breathing.

Move to fresh air.

If breathing has stopped, give artificial respiration.

If breathing is difficult, give oxygen.

LIQUID

Will burn skin and eyes.

Harmful if swallowed.

Remove contaminated clothing and shoes.

Flush affected areas with plenty of water.

IF IN EYES, hold eyelids open and flush with plenty of water.

IF SWALLOWED and victim is CONSCIOUS, have victim drink water

or milk.

DO NOT INDUCE VOMITING.

Water pollution:

Dangerous to aquatic life in high concentrations.

May be dangerous if it enters water intakes.

Notify local health and wildlife officials.

Notify operators of nearby water intakes.

RESPONSE TO DISCHARGE

Issue warning-corrosive Restrict access Disperse and flush

ABEL

Category: Corrosive

Class: 8

CHEMICAL DESIGNATIONS

CG compatibility class: Non-oxidizing mineral acid

Formula: HCl-H(2)O

MO/UN designation: 8.0/1789

DOT id no.: 1789

Topic: HYDROCHLORIC ACID

CAS registry no.: 7647-01-0

OBSERVABLE CHARACTERISTICS

Physical state: Liquid

Color: Colorless to light yellow

Odor: Pungent; sharp, pungent, irritating

HEALTH HAZARDS

Personal protective equipment: Self-contained breathing equipment, air-line mask, or industrial canister-type gas mask; rubber or rubber-coated gloves, apron, coat, overalls, shoes.

Symptoms following exposure: Inhalation of fumes results in coughing and choking sensation, and irritation of nose and lungs. Liquid causes burns.

Treatment of exposure: INHALATION: remove person to fresh air; keep him warm and quiet and get medical attention immediately; start artificial respiration if breathing stops. INGESTION: have person drink water or milk; do NOT induce vomiting. EYES: immediately flush with plenty of water for at least 15 min. and get medical attention; continue flushing for another 15 min. if physician does not arrive promptly. SKIN: immediately flush skin while removing contaminated clothing; get medical attention promptly; use soap and wash area for at least 15 min.

Threshold limit value: 5 ppm

Short term inhalation limits: 5 ppm for 5 min.

Toxicity by ingestion: Data not available

Late toxicity: None

Vapor (gas) irritant characteristics: Vapor is moderately irritating such that personnel will not usually tolerate moderate or high vapor concentrations.

Liquid or solid irritant characteristics: Fairly severe skin irritant; may cause pain and second-degree burns after a few minutes' contact.

Odor threshold: 1-5 ppm

IDLH value: 100 ppm

FIRE HAZARDS

Flash point: Not flammable

Flammable limits in air: Not flammable

Fire extinguishing agents: Not pertinent

Fire extinguishing agents NOT to be used: Not pertinent

Special hazards of combustion products: Toxic and irritating vapors are generated when heated.

Behavior in fire: Not pertinent

Ignition temperature: Not flammable

Electrical hazard: Not pertinent

Burning rate: Not flammable

Adiabatic flame temperature: Data not available

Stoichiometric air to fuel ratio: Data not available

Flame temperature: Data not available

CHEMICAL REACTIVITY

Reactivity with water: No reaction

Reactivity with common materials: Corrosive to most metals with evolution of hydrogen gas, which may form explosive mixtures with air.

Stability during transport: Stable

Topic: HYDROCHLORIC ACID

Neutralizing agents for acids and caustics: Flush with water; apply powdered limestone, slaked lime, soda ash, or sodium bicarbonate.

Polymerization: Not pertinent

Inhibitor of polymerization: Not pertinent

Molar ratio (reactant to product): Data not available

Reactivity group: 1

WATER POLLUTION

Aquatic toxicity: 282 ppm/96 hr/mosquito fish/TLm/fresh

water 100-330 ppm/48 hr/shrimp/LC(50)/salt water

Waterfowl toxicity: Data not available

Biological oxygen demand (BOD): None

Food chain concentration potential: None

SHIPPING INFORMATION

Grades of purity: Food processing or technical: 18 degrees

Be-27.9%, 20 Be-31.5%, 22 degrees Be-35.2%; Reagent, ACS,

and USP: 23 degrees Be-37.1%

Storage temperature: Ambient

Inert atmosphere: No requirement

Venting: Open

HAZARD CLASSIFICATIONS

Code of federal regulations: Corrosive material

HAZARD RATING FOR BULK WATER TRANSPORTATION:

| Category | Rating |
|-------------------------------|--------|
| Fire..... | 0 |
| Health | |
| Vapor Irritant..... | 3 |
| Liquid or Solid Irritant..... | 3 |
| Poisons..... | 2 |
| Water Pollution | |
| Human Toxicity..... | 2 |
| Aquatic Toxicity..... | 2 |
| Aesthetic Effect..... | 2 |
| Reactivity | |
| Other Chemicals..... | 3 |
| Water..... | 0 |
| Self Reaction..... | 0 |

FPA HAZARD CLASSIFICATION:

| Category | Classification |
|---------------------------|----------------|
| Health Hazard (Blue)..... | 3 |
| Flammability (Red)..... | 0 |
| Reactivity (Yellow)..... | 0 |

PHYSICAL AND CHEMICAL PROPERTIES

Physical state at 15 degrees C. and 1 ATM: Liquid

Molecular weight: 36.46

Boiling point at 1 ATM: 123 degrees F = 50.5 degrees C =
323.8 degrees K

Freezing point: Not pertinent

Critical temperature: Not pertinent

Critical pressure: Not pertinent

Specific gravity: 1.19 at 20 degrees C (liquid)

Liquid surface tension: Not pertinent

Liquid water interfacial tension: Not pertinent

Vapor (gas) specific gravity: Not pertinent

Ratio of specific heats of vapor (gas): Not pertinent

Topic: HYDROCHLORIC ACID

Latent heat of vaporization: $178 \text{ Btu/lb} = 98.6 \text{ cal/g} = 4.13$

$\times 10(5) \text{ J/kg}$

Heat of combustion: Not pertinent

Heat of decomposition: Not pertinent

Heat of solution: $-860 \text{ Btu/lb} = -480 \text{ cal/g} = -20 \times 10(5)$
J/kg

Heat of polymerization: Not pertinent

Heat of fusion: 13.0 cal/g

Limiting value: Data not available

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: HYDROGEN

1.0 IDENTIFIERS

CAS Number: 1333-74-0
DOT Number: Gas UN 1049/Liquid UN 1966

RTK Substance number: 1010
Date: March 1989 Revision: First

2.0 HAZARD SUMMARY

- * Hydrogen can affect you when breathed in.
- * Exposure to high levels can cause suffocation from lack of oxygen.
- * Contact with liquid Hydrogen can cause frostbite.
- * Hydrogen is a HIGHLY FLAMMABLE LIQUID or GAS and a DANGEROUS FIRE and EXPLOSION HAZARD.

IDENTIFICATION

Hydrogen is a colorless gas or compressed liquid. It is used in welding, thermonuclear reactions and in making ammonia hydrocarbon chemicals, vegetable oils, and in many other industrial operations.

REASON FOR CITATION

- * Hydrogen is on the Hazardous Substance List because it is cited by ACGIH, DOT, and NFPA.
- * This chemical is on the Special Health Hazard Substance List because it is FLAMMABLE.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

- * Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.20.
- * If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WORKPLACE EXPOSURE LIMITS

No occupational exposure limits have been determined for this substance. This does not mean that this substance is not harmful. Safe work practices should always be followed.

- * Large amounts of Hydrogen will decrease the amount of available oxygen. Oxygen content should be tested to ensure that it is at least 19% by volume in confined spaces.
- * The health effects caused by exposure to Hydrogen are much less serious than its fire and explosion hazard.

Topic: HYDROGEN

WAYS OF REDUCING EXPOSURE

- * Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- * Wear protective gloves and clothing to avoid contact with cold liquid Hydrogen.
- * Monitors can be worn which indicate low oxygen levels. Continuous analyzers can be installed to monitor for a dangerous release of Hydrogen gas.
- * Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of Hydrogen to potentially exposed workers.

 This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

3.0 HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to Hydrogen:

- * Exposure to high levels can cause suffocation from lack of oxygen.
- * Contact with liquid Hydrogen can cause frostbite.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to Hydrogen and can last for months or years:

Cancer Hazard

- * According to the information presently available to the New Jersey Department of Health, Hydrogen has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

- * According to the information presently available to the New Jersey Department of Health, Hydrogen has not been tested for its ability to affect reproduction.

Other Long-Term Effects

- * Hydrogen has not been tested for other chronic (long-term)

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: HYDROGEN

health effects.

MEDICAL

Medical Testing

There is no special test for this chemical. However, if illness occurs or overexposure is suspected, medical attention is recommended.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, ENGINEERING CONTROLS are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

- * Where possible, automatically pump liquid Hydrogen from drums or other storage containers to process containers.
- * Specific engineering controls are required for this chemical by OSHA. Refer to OSHA standard 1910.103.
- * Before entering a confined space where Hydrogen is present, check to make sure sufficient (19%) oxygen exists.
- * Before entering a confined space where Hydrogen may be present, check to make sure that an explosive concentration does not exist.

Good WORK PRACTICES can help to reduce hazardous exposures.

The following work practices are recommended:

- * Do not smoke in work areas.
- * Do not damage containers or use these containers for other substances.

4.0 PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: HYDROGEN

EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

- * Avoid skin contact with Hydrogen. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- * Where exposure to cold equipment, vapors, or liquid may occur, employees should be provided with special clothing designed to prevent the freezing of body tissues.
- * All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

- * Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

- * Exposure to Hydrogen is dangerous because it can replace oxygen and lead to suffocation. Only MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in positive pressure mode should be used in oxygen deficient environments.

5.0 QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: HYDROGEN

exposed to chemicals?

A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?

A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

The following information is available from:

New Jersey Department of Health
Occupational Health Service Trenton, NJ 08625-0360 (609)
984-1863

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health physician who can help you find the services you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions,

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: HYDROGEN

trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-5627.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

CAG is the Carcinogens Assessment Group of the federal EPA.

A carcinogen is a substance that causes cancer.

The CAS number is assigned by the Chemical Abstracts Service to identify a specific chemical.

A combustible substance is a solid, liquid or gas that will burn.

A corrosive substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A fetus is an unborn human or animal.

A flammable substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The flash point is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: HYDROGEN

scientific group that classifies chemicals according to their cancer-causing potential.

A miscible substance is a liquid or gas that will evenly dissolve in another.

mg/m³ means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A mutagen is a substance that causes mutations. A mutation is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A reactive substance is a solid, liquid or gas that can cause an explosion under certain conditions or on contact with other specific substances.

A teratogen is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The vapor pressure is a measure of how readily a liquid or a

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: HYDROGEN

solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

6.0 EMERGENCY INFORMATION

Common Name: HYDROGEN
DOT Number: Gas UN 1049/Liquid UN 1966
DOT Emergency Guide code: 22/22
CAS Number: 1333-74-0

| Hazard rating | NJ DOH | NFPA |
|---|--------|------|
| FLAMMABILITY | - | 4 |
| REACTIVITY | - | 0 |
| HIGHLY FLAMMABLE GAS AND EXPLOSIVE ASPHYXIAN CONTAINERS MAY EXPLODE IN FIRE | | |

Hazard Rating Key: 0=minimal; 1=slight;
2=moderate; 3=serious; 4=severe

FIRE HAZARDS

- * Hydrogen is a flammable gas/LIQUID.
- * CONTAINERS MAY EXPLODE IN FIRE.
- * STOP FLOW OF GAS. Vapors may travel to a source of ignition and flash back.
- * Use dry chemical, CO2, water spray, or foam extinguishers.
- * Use water spray to keep fire exposed containers cool.
- * If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If Hydrogen gas is leaked, take the following steps:

- * Restrict persons not wearing protective equipment from area of leak until clean-up is complete. Gas build-up may cause suffocation.
- * Remove all ignition sources.
- * Ventilate area of leak to disperse the gas.
- * Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

If liquid Hydrogen is spilled or leaked, take the following steps:

- * Restrict persons not wearing protective equipment from area of spill or leak until cleanup is complete.

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: HYDROGEN

- * Remove all ignition sources.
- * Stop the leak or move the container to a safe area and allow the liquid to evaporate.
- * Keep Hydrogen out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
- * It may be necessary to contain and dispose of Hydrogen as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172 Other:

HANDLING AND STORAGE

- * Prior to working with Hydrogen you should be trained on its proper handling and storage.
- * Procedures for the handling, use, storage, and inspection of Hydrogen cylinders should be in compliance with OSHA 1910.103 and Subpart M and follow the recommendations of the Compressed Gas Association.
- * Hydrogen must be stored to avoid contact with HEAT, FLAMES, SPARKS, and OXYGEN since it is a violent explosive.
- * Sources of ignition such as smoking and open flames are prohibited where Hydrogen is used, handled, or stored.
- * Metal containers involving the transfer of 5 gallons or more of Hydrogen should be grounded and bonded. Drums must be equipped with self-closing valves, pressure vacuum bungs, and flame arresters.
- * Use only non-sparking tools and equipment, especially when opening and closing containers of Hydrogen.
- * Wherever Hydrogen is used, handled, manufactured, or stored, use explosion proof electrical equipment and fittings.
- * Piping should be electrically bonded and grounded.

FIRST AID

In NJ, POISON INFORMATION 1-800-962-1253 Other:

Contact With Liquid Hydrogen

- * Put affected part of body into warm water. Seek medical attention.

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: HYDROGEN

Breathing

- * Remove the person from exposure.
- * Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
- * Transfer promptly to a medical facility.

PHYSICAL DATA

Water Solubility: Slightly soluble

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH

Right to Know Program CN 368, Trenton, NJ 08625-0368 (609)
984-2202

Topic: ISOBUTYLENE

1. (1972) ND **PEER REVIEWED** [SRI
2. (1975) ND **PEER REVIEWED** [SRI
3. (1985) ND **QC REVIEWED**

CHEMICAL & PHYSICAL PROPERTIES

Color/Form:

1. COLORLESS LIQUID OR EASILY LIQUEFIED GAS **PEER REVIEWED** [Hawley, G.G. The Condensed Chemical Dictionary. 9th ed. New York: Van Nostrand Reinhold Co., 1977. 477

Odor:

1. COAL GAS ODOR **PEER REVIEWED** [Hawley, G.G. The Condensed Chemical Dictionary. 9th ed. New York: Van Nostrand Reinhold Co., 1977. 477

Boiling Point:

1. -6.9 DEG C **PEER REVIEWED** [Weast, R.C. (ed.). Handbook of Chemistry and Physics. 60th ed. Boca Raton, Florida: CRC Press Inc., 1979.,p. C-464

Melting Point:

1. -140.35 DEG C **PEER REVIEWED** [Weast, R.C. (ed.). Handbook of Chemistry and Physics. 60th ed. Boca Raton, Florida: CRC Press Inc., 1979.,p. C-464

Molecular Weight:

1. 56.10 **PEER REVIEWED** [The Merck Index. 9th ed. Rahway, New Jersey: Merck & Co., Inc., 1976. 674

Density/Specific Gravity:

1. 0.5942 @ 20 DEG C/4 DEG C **PEER REVIEWED** [Weast, R.C. (ed.). Handbook of Chemistry and Physics. 60th ed. Boca Raton, Florida: CRC Press Inc., 1979.,p. C-464

Solubilities:

1. PRACTICALLY INSOL IN WATER; VERY SOL IN ALCOHOL, ETHER **PEER REVIEWED** [The Merck Index. 9th ed. Rahway, New Jersey: Merck & Co., Inc., 1976. 674
2. SOL IN BENZENE, PETROLEUM ETHER, SULFURIC ACID **PEER REVIEWED** [Weast, R.C. (ed.). Handbook of Chemistry and Physics. 60th ed. Boca Raton, Florida: CRC Press Inc., 1979.,p. C-464

Spectral Properties:

1. INDEX OF REFRACTION: 1.3926 @ -25 DEG C; SADTLER REF NUMBER: 7858 (IR, PRISM) **QC REVIEWED** [Weast, R.C. (ed.). Handbook of Chemistry and Physics. 60th ed. Boca Raton, Florida: CRC Press Inc., 1979.,p. C-464
2. MAX ABSORPTION: 159 NM (LOG E= 3.9); 184 NM, 188 NM (LOG E= 4.1); 192 NM SHOULDER (LOG E= 3.9); 200 NM SHOULDER (LOG E= 3.9) **PEER REVIEWED** [Weast, R.C. (ed.). Handbook of Chemistry and Physics. 60th ed. Boca Raton, Florida: CRC Press Inc., 1979.,p. C-464
3. IR: 8514 (Sadtlar Research Laboratories IR Grating Collection) **QC REVIEWED** [Weast, R.C. and M.J. Astle. CRC Handbook of Data on Organic Compounds. Volumes I and II. Boca Raton, FL: CRC Press Inc. 1985.,p. VI 355

Topic: ISOBUTYLENE

4. MASS: 26 (Atlas of Mass Spectral Data, John Wiley & Sons, New York) **QC REVIEWED** [Weast, R.C. and M.J. Astle. CRC Handbook of Data on Organic Compounds. Volumes I and II. Boca Raton, FL: CRC Press Inc. 1985.,p. V1 355

Vapor Density:

1. 1.94 **PEER REVIEWED** [Sax, N.I. Dangerous Properties of Industrial Materials. 5th ed. New York: Van Nostrand Reinhold, 1979. 750

Vapor Pressure:

1. 3290 MM HG @ 40.5 DEG C **PEER REVIEWED** [Sax, N.I. Dangerous Properties of Industrial Materials. 4th ed. New York: Van Nostrand Reinhold, 1975. 840

Other Chemical/Physical Properties:

1. REACTS EASILY WITH NUMEROUS MATERIALS, POLYMERIZES EASILY **PEER REVIEWED** [Hawley, G.G. The Condensed Chemical Dictionary. 9th ed. New York: Van Nostrand Reinhold Co., 1977. 477
2. TASTELESS & ODORLESS /ISOBUTYLENE POLYMERS/ **PEER REVIEWED** [Lefaux, R. Practical Toxicology of Plastics. Cleveland: CRC Press Inc., 1968. 34
3. MASS: 184 (Aldermaston, Eight Peak Index of Mass Spectra, UK) /Tetraisobutylene/ **QC REVIEWED** [Weast, R.C. and M.J. Astle. CRC Handbook of Data on Organic Compounds. Volumes I and II. Boca Raton, FL: CRC Press Inc. 1985.,p. V1 356
4. IR: 2383 (Coblentz Society Spectral Collection) /Triisobutylene/ **QC REVIEWED** [Weast, R.C. and M.J. Astle. CRC Handbook of Data on Organic Compounds. Volumes I and II. Boca Raton, FL: CRC Press Inc. 1985.,p. V1 356
5. MASS: 1114 (Atlas of Mass Spectral Data, John Wiley & Sons, New York) /Triisobutylene/ **QC REVIEWED** [Weast, R.C. and M.J. Astle. CRC Handbook of Data on Organic Compounds. Volumes I and II. Boca Raton, FL: CRC Press Inc. 1985.,p. V1 356

SAFETY & HANDLING

Emergency Guidelines

DOT Emergency Guidelines:

1. Fire or Explosion: Extremely flammable; may be ignited by heat, sparks or flames. Vapors may travel to a source of ignition and flash back. Container may explode in heat of fire. Vapor explosion hazard indoors, outdoors or in sewers. **QC REVIEWED** [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987.,p. G-22
2. Health Hazards: Vapors may cause dizziness or suffocation. Contact will cause severe frostbite. Fire may produce irritating or poisonous gases. **QC REVIEWED** [Department of Transportation. Emergency Response Guidebook 1987. DOT

Topic: ISOBUTYLENE

P 5800.4. Washington, DC: U.S. Government Printing Office, 1987.,p. G-22

3. Emergency Action: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind, out of low areas, and ventilate closed spaces before entering. Self-contained breathing apparatus (SCBA) and structural firefighter's protective clothing will provide limited protection. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire. CALL CHEMTREC AT 1-800-424-9300 AS SOON AS POSSIBLE, especially if there is no local hazardous materials team available. **QC REVIEWED** [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987.,p. G-22
4. Fire: Let tank car, tank truck or storage tank burn unless leak can be stopped; with smaller tanks or cylinders, extinguish/isolate from other flammables. Small Fires: Dry chemical, CO2 or Halon. Large Fires: Water spray or fog. Move container from fire area if you can do it without risk. Cool containers that are exposed to flames with water from the side until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire. **QC REVIEWED** [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987.,p. G-22
5. Spill or Leak: Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors; isolate area until gas has dispersed. **QC REVIEWED** [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987.,p. G-22
6. First Aid: Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of frostbite, thaw frosted parts with water. Keep victim quiet and maintain normal body temperature. **QC REVIEWED** [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987.,p. G-22

Flammable Properties

Fire Potential:

1. VERY DANGEROUS, WHEN EXPOSED TO HEAT OR FLAME. **PEER REVIEWED** [Sax, N.I. Dangerous Properties of Industrial

Topic: ISOBUTYLENE

Materials. 5th ed. New York: Van Nostrand Reinhold, 1979. 750

Flash Point:

1. -105 DEG F **PEER REVIEWED** [Hawley, G.G. The Condensed Chemical Dictionary. 9th ed. New York: Van Nostrand Reinhold Co., 1977. 477

Autoignition Temperature:

1. 869 DEG F **PEER REVIEWED** [Hawley, G.G. The Condensed Chemical Dictionary. 9th ed. New York: Van Nostrand Reinhold Co., 1977. 477

Fire Fighting Information

Explosive Limits and Potential:

1. EXPLOSIVE LIMITS IN AIR 1.8% TO 8.8% **PEER REVIEWED** [Hawley, G.G. The Condensed Chemical Dictionary. 9th ed. New York: Van Nostrand Reinhold Co., 1977. 477

Hazardous Reactions

Reactivities and Incompatibilities:

1. CAN REACT VIGOROUSLY WITH OXIDIZING MATERIALS. **PEER REVIEWED** [Sax, N.I. Dangerous Properties of Industrial Materials. 5th ed. New York: Van Nostrand Reinhold, 1979. 750

Preventive Measures

Protective Equipment and Clothing:

1. PROTECTIVE CLOTHING, BARRIER CREAMS...MEDICAL CONTROL... **PEER REVIEWED** [Sax, N.I. Dangerous Properties of Industrial Materials. 4th ed. New York: Van Nostrand Reinhold, 1975. 841

Other Protective Measures:

1. VENTILATION CONTROL: THE BASIC VENTILATION METHODS ARE LOCAL EXHAUST VENTILATION AND DILUTION OR GENERAL VENTILATION. **PEER REVIEWED** [Sax, N.I. Dangerous Properties of Industrial Materials. 4th ed. New York: Van Nostrand Reinhold, 1975. 841
2. ...SUBSTITUTION OF LESS IRRITATING SUBSTANCES...REDESIGN OF OPERATIONS...PREVENT CONTACT, PROVISION OF A PHYSICAL BARRIER AGAINST CONTACT, PROPER WASHING FACILITIES, WORK CLOTHING AND STORAGE FACILITIES... **PEER REVIEWED** [Sax, N.I. Dangerous Properties of Industrial Materials. 4th ed. New York: Van Nostrand Reinhold, 1975. 841

Other Safety & Handling

Stability/Shelf Life:

1. VOLATILE **PEER REVIEWED** [Hawley, G.G. The Condensed Chemical Dictionary. 9th ed. New York: Van Nostrand Reinhold Co., 1977. 477

Shipment Methods and Regulations:

1. CONTAINERS: TANK CARS; CYLINDERS. ... SHIPPING REGULATIONS: (RAIL) RED GAS LABEL. (AIR) FLAMMABLE GAS LABEL. NOT ACCEPTABLE ON PASSENGER PLANES. **PEER REVIEWED** [Hawley, G.G. The Condensed Chemical

Topic: ISOBUTYLENE

Dictionary. 9th ed. New York: Van Nostrand Reinhold Co., 1977. 477

Storage Conditions:

1. ...MATERIALS WHICH ARE TOXIC AS STORED OR WHICH CAN DECOMPOSE INTO TOXIC COMPONENTS...SHOULD BE STORED IN A COOL, WELL VENTILATED PLACE, OUT OF THE DIRECT RAYS OF THE SUN, AWAY FROM AREAS OF HIGH FIRE HAZARD, AND SHOULD BE PERIODICALLY INSPECTED. INCOMPATIBLE MATERIALS SHOULD BE ISOLATED... **PEER REVIEWED** [Sax, N.I. Dangerous Properties of Industrial Materials. 4th ed. New York: Van Nostrand Reinhold, 1975. 841

TOXICITY/BIOMEDICAL EFFECTS

Toxicity Excerpts

Human Toxicity Excerpts:

1. BUTYLENE ISOMERS ARE SIMILAR IN PHARMACOLOGICAL ACTIVITY AS ASPHYXIANTS & WEAK ANESTHETICS. ...ABOUT 4.5 TIMES AS TOXIC AS ETHYLENE. /BUTYLENE ISOMERS/ **PEER REVIEWED** [Patty, F. (ed.). Industrial Hygiene and Toxicology: Volume II: Toxicology. 2nd ed. New York: Interscience Publishers, 1963. 1204

Pharmacokinetics

Absorption, Distribution and Excretion:

1. FASTED RATS EXHALE THE HYDROCARBONS @ RATE OF APPROX 1.7 NMOL/KG/HR. THROUGH AN IMPROVED ANALYTICAL PROCEDURE OTHER VOLATILE HYDROCARBONS COULD BE DETECTED IN BREATH OF ANIMALS. **PEER REVIEWED** [FRANK H ET AL; TOXICOL APPL PHARMACOL 56(3) 337 (1980)

Interactions:

1. GAS-LIQUID CHROMATOGRAPHY WAS USED TO STUDY BRAIN HYDROCARBON CONTENT IN RATS & MICE INHALING MIXTURES OF BUTANE & ISOBUTYLENE. THERE WAS SUMMATION OF CNS DEPRESSANT EFFECTS OF BUTANE & ISOBUTYLENE TOWARD POTENTIATION RATHER THAN ANTAGONISM. **PEER REVIEWED** [SHUGAEV BB; FARMAKOL TOKSIKOL (MOSCOW); 30(1) 102 (1967)

ENVIRONMENTAL FATE/EXPOSURE POTENTIAL

Pollution Sources

Natural Occurring Sources:

1. ISOBUTYLENE IS A COMPONENT OF PETROLEUM AND NATURAL GAS **QC REVIEWED** [USITC. SYN ORG CHEM-U.S. PROD/SALES 1984

Human Exposure

Probable Exposures:

1. UNLESS ENCOUNTERED IN SUFFICIENT CONCEN TO CAUSE ASPHYXIA, THESE OLEFINS DO NOT APPEAR TO WARRANT SERIOUS CONSIDERATION FOR THEIR EFFECTS ON HEALTH OF WORKMEN EXPOSED TO LOW CONCEN FOR PROLONGED PERIODS OR TO HIGHER CONCEN FOR...SHORT PERIODS... **PEER REVIEWED** [Patty, F. (ed.). Industrial Hygiene and Toxicology: Volume II: Toxicology. 2nd ed. New York: Interscience Publishers, 1963. 1204

Topic: ISOBUTYLENE

MONITORING AND ANALYSIS METHODS

Analytic Laboratory Methods:

1. SIMPLE, RAPID & SENSITIVE COLORIMETRIC METHOD WAS DEVELOPED TO DETERMINE ISOBUTYLENE IN AIR. **PEER REVIEWED** [LIPINA TG; GIG TR PROF ZABOL 17(1) 45 (1973)
2. GAS CHROMATOGRAPHY WAS USED TO STUDY DISTRIBUTION OF 6 VOLATILE HYDROCARBONS IN MOUSE & RAT BODY TISSUES. **PEER REVIEWED** [SHUGAEV BB; FARMAKOL TOKSIKOL (MOSCOW) 31(3) 360 (1968)

ADDITIONAL REFERENCES

Test Status:

1. The NTP Toxicology Research and Testing Program releases a Management Status Report on a quarterly basis. This report gives the status of chemicals studied, under study, or proposed for study by NTP. The mid-1993 issue indicates that two year study is in progress for isobutylene. Route: inhalation; Species: rats and mice. **QC REVIEWED** [NTP; Division of Toxicology Research and Testing; Management Status Report; 07/07/93; p.17

5.2 Chemical Hazard Information

Onsite personnel may be exposed to chemical hazards while observing or participating in surface soil sampling. There is potential for dermal contact of the constituents outlined below.

Diesel Fuel Oil and Heating Oil: Diesel Fuel Oil is a complex petroleum mixture of paraffinic, olefinic, naphthenic, and aromatic hydrocarbons. The benzene content is typically less than 100 ppm in the source product. Excessive inhalation exposure may cause respiratory irritation, headache, dizziness, nausea, vomiting, and loss of coordination. Prolonged skin contact may lead to irritation of hair follicles and blockage of the sebaceous glands. Good personal hygiene will prevent this. There is no OSHA permissible exposure limit for diesel Fuel Oil.

Gasoline: Gasoline is a variable mixture of paraffins, aromatics, and olefins. Acute toxicity includes anesthetic effects and mucus membrane irritation. Symptoms of acute exposure include headache, blurred vision, dizziness, and nausea. The major toxicity concern is benzene, a known human carcinogen through inhalation. Gasoline typically contains 0.7 to 1.0 percent benzene. The OSHA time weighted average (TWA) for benzene is currently 1 ppm.

Gasoline also contains lead, which has adverse health effects if inhaled. The OSHA TWA for lead is 50 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$); however, lead is not readily volatilized. The overall threshold limit value (TLV) for gasoline is 300 ppm, based largely upon assumptions about the hydrocarbon content of gasoline.

Skin contact with gasoline can produce immediate or delayed symptoms of dryness or irritation. If skin comes in contact with gasoline, remove clothing from affected skin area and wash promptly with soap and water. Dry the skin carefully with a clean towel. If skin is inflamed, painful or blistered, seek medical attention. If ingestion occurs, do not induce vomiting. Get medical help. Be prepared to administer artificial respiration.

Kerosene: Kerosene is a refined petroleum distillate consisting primarily of C10 to C16 hydrocarbons. It is a variable mixture of paraffins, naphthenes, olefins, and aromatics. The vapor pressure at 20°C is approximately 5 millimeters (mm) mercury (Hg). There is no OSHA permissible exposure level (PEL), but the National Institute of Occupational Safety and Health (NIOSH) recommends an exposure limit (REL) of 100 milligrams per cubic meter (mg/m^3). (This is approximately 14 ppm.) Overexposure may cause headaches, dizziness, nausea, stupor, and respiratory tract and eye irritation. The primary health hazard is skin irritation and dermatitis from prolonged or repeated skin contact. Ingestion can be irritating to the mouth, throat, and digestive tract with the hazard of aspiration into the lungs.

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: METHANE

1.0 IDENTIFIERS

CAS Number: 74-82-8
DOT Number: UN 1971/UN 1972

RTK Substance number: 1202
Date: January 1986

2.0 HAZARD SUMMARY

- * Methane can affect you when breathed in.
- * Very high levels can cause suffocation from lack of oxygen.
- * Chemical cartridge respirators should not be used where Methane exposure occurs. For high exposures use air supplied respirators.
- * Contact with liquified Methane can cause frostbite.
- * Methane is a HIGHLY FLAMMABLE Gas and a dangerous FIRE and EXPLOSION HAZARD.

IDENTIFICATION

Methane is an odorless, colorless gas used as a fuel and in the manufacture of organic chemicals, acetylene, hydrogen cyanide, and hydrogen. It may also be a cold liquid.

REASON FOR CITATION

- * Methane is on the Hazardous Substance List because it is cited by ACGIH, DOT and NFPA.
- * This chemical is on the Special Health Hazard Substance List because it is FLAMMABLE.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

- * Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.20.
- * If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WORKPLACE EXPOSURE LIMITS

- * No exposure limits have been determined for this chemical.
- * The health effects caused by exposure to Methane are much less serious than its fire and explosion risk.
- * Large amounts of Methane will decrease the amount of available oxygen. Oxygen content should be tested to ensure that it is at least 19% by volume.

WAYS OF REDUCING EXPOSURE

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: METHANE

Eye Protection

- * Wear gas-proof goggles, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

- * Exposure to Methane is dangerous because it can replace oxygen and lead to suffocation. Only MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in positive pressure mode should be used in oxygen deficient environments.

5.0 QUESTIONS AND ANSWERS

- Q: If I have acute health effects, will I later get chronic health effects?
- A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.
- Q: Can I get long-term effects without ever having short-term effects?
- A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.
- Q: What are my chances of getting sick when I have been exposed to chemicals?
- A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.
- Q: When are higher exposures more likely?
- A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).
- Q: Is the risk of getting sick higher for workers than for community residents?
- A: Yes. Exposures in the community, except possibly in cases

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: METHANE

of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

The following information is available from:

New Jersey Department of Health
Occupational Health Service Trenton, NJ 08625-0360 (609)
984-1863

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health physician who can help you find the services you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-5627.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: METHANE

CAG is the Carcinogens Assessment Group of the federal EPA.

A carcinogen is a substance that causes cancer.

The CAS number is assigned by the Chemical Abstracts Service to identify a specific chemical.

A combustible substance is a solid, liquid or gas that will burn.

A corrosive substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A fetus is an unborn human or animal.

A flammable substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The flash point is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A miscible substance is a liquid or gas that will evenly dissolve in another.

mg/m³ means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A mutagen is a substance that causes mutations. A mutation is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NCI is the National Cancer Institute, a federal agency that

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: METHANE

determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A reactive substance is a solid, liquid or gas that can cause an explosion under certain conditions or on contact with other specific substances.

A teratogen is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The vapor pressure is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

6.0 EMERGENCY INFORMATION

Common Name: METHANE
DOT Number: UN 1971/UN 1972
DOT Emergency Guide code:
CAS Number: 74-82-8

| | | |
|----------------------|--------|------|
| Hazard rating | NJ DOH | NFPA |
| FLAMMABILITY | | 4 |
| REACTIVITY | | 0 |
| HIGHLY FLAMMABLE GAS | | |

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: METHANE

CONTAINERS MAY EXPLODE IN FIRE
ASPHYXIAN GAS

Hazard Rating Key: 0=minimal; 1=slight;
2=moderate; 3=serious; 4=severe

FIRE HAZARDS

- * Methane is a flammable gas.
- * CONTAINERS MAY EXPLODE IN FIRE.
- * THE FLAME MAY BE INVISIBLE.
- * Stop the flow of gas.
- * Use water spray to disperse the vapors.
- * For small fires use dry chemical or carbon dioxide extinguishers.
- * For large fires use water spray, fog, or foam.
- * If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If Methane is leaked, take the following steps:

- * Restrict persons not wearing protective equipment from area of leak until cleanup is complete.
- * Remove all ignition sources.
- * Ventilate area of leak to disperse the gas.
- * Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.
- * Use water spray to reduce vapor.
- * It may be necessary to contain and dispose of Methane as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172 Other:

HANDLING AND STORAGE

- * Prior to working with Methane you should be trained on its proper handling and storage.
- * Procedures for handling, use, and storage of Methane cylinders should be in compliance with OSHA 1910.101 and subpart "M" and follow the recommendations of the

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: METHANE

Compressed Gas Association.

- * Methane must be stored to avoid contact with OXIDIZERS (such as OXYGEN, CHLORINE, BROMINE, PERCHLORATES, PEROXIDES, NITRATES, and PERMANGANATES) since violent reactions occur.
- * Sources of ignition such as smoking and open flames are prohibited where Methane is handled, used, or stored.
- * Use only non-sparking tools and equipment, especially when opening and closing containers of Methane.
- * Wherever Methane is used, handled, manufactured, or stored, use explosion-proof electrical equipment and fittings.

FIRST AID

In NJ, POISON INFORMATION 1-800-962-1253 Other:

Breathing

- * Remove the person from exposure.
- * Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
- * Transfer promptly to a medical facility.

If frostbite occurs:

- * Immerse affected part in warm (not hot) water. Seek medical attention.

PHYSICAL DATA

Flash Point: -306 degrees F (-187.7 degrees C) Water
Solubility: Soluble

OTHER COMMONLY USED NAMES

Chemical Name:
Methyl Hydride

Other Names and Formulations:
Natural Gas; Marsh Gas; Biogas

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH

Right to Know Program CN 368, Trenton, NJ 08625-0368 (609)
984-2202

Baxter Healthcare Corporation
Burdick & Jackson Division
1953 South Harvey Street
Muskegon, MI 49442 USA

information/emergency telephone no. 616.726.3171
chemtrec telephone no. 800.424.9300
canadian emergency telephone no. 613.996.6666

MATERIAL SAFETY DATA SHEET

METHANOL

I. Identification

chemical name Methanol molecular weight 32.04
chemical family Alcohol formula CH₄O
synonyms Carbinol, Methyl Alcohol, Wood Alcohol
DOT proper shipping name Methyl Alcohol or Methanol
DOT hazard class Flammable Liquid
DOT identification no. UN1230 CAS no. 67-56-1

II. Physical and Chemical Data

boiling point, 760mm Hg. 64.7°C freezing point -97.7°C evaporation rate (BuAc=1) ca 5
vapor pressure at 20°C 97 mm Hg vapor density (air=1) 1.11 solubility in water @ 20°C complete
% volatiles by volume ca 100 specific gravity (H₂O=1) @ 20°C 0.792 stability Stable
hazardous polymerization Not expected to occur.
appearance and odor A clear, colorless liquid with a slight alcoholic odor.
conditions to avoid Heat, sparks, open flame, open containers, and poor ventilation.

materials to avoid Strong oxidizing agents and reactive metals which will displace hydrogen.

hazardous decomposition products Incomplete combustion can generate carbon monoxide and other toxic vapors such as formaldehyde.

III. Fire and Explosion Hazard Data

flash point, (test method) 12°C (Tag closed cup) auto ignition temperature 385°C
flammable limits in air % by volume: lower limit 6.7 upper limit 36.5
unusual fire and explosion hazards May burn with an invisible flame. Mixtures with water as low as 21% by volume are still flammable (flash point below 37.8°C). Under some circumstances can corrode certain metals, including aluminum and zinc, and generate hydrogen gas.
extinguishing media Carbon dioxide, dry chemical, alcohol foam, water mist or fog.
special fire fighting procedures Wear full protective clothing and self-contained breathing apparatus. Heat will build pressure and may rupture closed storage containers. Keep fire-exposed containers cool with water spray.

IV. Hazardous Components

Methanol % ca 100 TLV 200 ppm (skin) CAS no. 67-56-1

Burdick & Jackson's Disclaimer: The information and recommendations presented in this Material Safety Data Sheet are based on sources believed to be reliable on the date hereof. Burdick & Jackson makes no representation on its completeness or accuracy. It is the user's responsibility to determine the product's suitability for its intended use, the product's safe use, and the product's proper disposal. No representations or warranties, either express or implied, of merchantability or fitness for a particular purpose or of any other nature are made with respect to the information provided in this Material Safety Data Sheet or to the product to which such information refers. Burdick & Jackson neither assumes nor authorizes any other person to assume for it, any other or additional liability or responsibility resulting from the use of, or reliance upon, this information.

Emergency First Aid

- Inhalation:** Immediately remove to fresh air. If not breathing, administer mouth-to-mouth rescue breathing. If there is no pulse administer cardiopulmonary resuscitation (CPR). Contact physician immediately.
- Eye Contact:** Rinse with copious amounts of water for at least 15 minutes. Get emergency medical assistance.
- Skin Contact:** Flush thoroughly for at least 15 minutes. Wash affected skin with soap and water. Remove contaminated clothing and shoes. Wash clothing before re-use, and discard contaminated shoes. Get emergency medical assistance.
- Ingestion:** Call local Poison Control Center for assistance. Contact physician immediately. Never induce vomiting or give anything by mouth to a victim unconscious or having convulsions.

Note to Physician

In case of ingestion or massive inhalation, observe victim as an inpatient because slow metabolism causes a latent period of 24 hours between exposure and acidosis and blindness.

VI. Safety Measures and Equipment

- Ventilation:** Adequate ventilation is required to protect personnel from exposure to chemical vapors exceeding the PEL and to minimize fire hazards. The choice of ventilation equipment, either local or general, will depend on the conditions of use, quantity of material, and other operating parameters.
- Respiratory:** Use approved respirator equipment. Follow NIOSH and equipment manufacturer's recommendations to determine appropriate equipment (air-purifying, air-supplied, or self-contained breathing apparatus).
- Eyes:** Safety glasses are considered minimum protection. Goggles or face shield may be necessary depending on quantity of material and conditions of use.
- Skin:** Protective gloves and clothing are recommended. The choice of material must be based on chemical resistance and other user requirements. Generally, neoprene, nitrile rubber, or rubber offer acceptable chemical resistance. Individuals who are acutely and specifically sensitive to methanol may require additional protective equipment.

Occupational Health Guideline for Methyl Alcohol

INTRODUCTION

This guideline is intended as a source of information for employees, employers, physicians, industrial hygienists, and other occupational health professionals who may have a need for such information. It does not attempt to present all data; rather, it presents pertinent information and data in summary form.

SUBSTANCE IDENTIFICATION

- Formula: CH_3OH
- Synonyms: Methanol; wood alcohol; Columbian spirits; carbinol
- Appearance and odor: Colorless liquid with a characteristic, pungent odor.

PERMISSIBLE EXPOSURE LIMIT (PEL)

The current OSHA standard for methyl alcohol is 200 parts of methyl alcohol per million parts of air (ppm) averaged over an eight-hour work shift. This may also be expressed as 260 milligrams of methyl alcohol per cubic meter of air (mg/m^3). NIOSH has recommended that the permissible exposure limit be changed to 200 ppm averaged over a work shift of up to 10 hours per day, 40 hours per week, with a ceiling of 800 ppm averaged over a 15-minute period. The NIOSH Criteria Document for Methyl Alcohol should be consulted for more detailed information.

HEALTH HAZARD INFORMATION

• Routes of exposure

Methyl alcohol can affect the body if it is swallowed, is inhaled, or comes in contact with the skin or eyes.

• Effects of overexposure

1. Short-term Exposure: Swallowing methyl alcohol or breathing very high concentrations of methyl alcohol may produce headache, weakness, drowsiness, lightheadedness, nausea, vomiting, drunkenness, and irritation of the eyes, blurred vision, blindness, and death. A

person may get better and then worse again up to 30 hours later.

2. Long-term Exposure: Prolonged exposure to higher concentrations of methyl alcohol may result in headaches, burning of the eyes, dizziness, sleep problems, digestive disturbances, and failure of vision. Repeated or prolonged skin exposure may cause skin irritation.

3. Reporting Signs and Symptoms: A physician should be contacted if anyone develops any signs or symptoms and suspects that they are caused by exposure to methyl alcohol.

• Recommended medical surveillance

The following medical procedures should be made available to each employee who is exposed to methyl alcohol at potentially hazardous levels:

1. Initial Medical Examination:

—A complete history and physical examination: The purpose is to detect pre-existing conditions that might place the employee at increased risk, and to establish a baseline for future health monitoring. Examination of the skin, liver, kidneys, and eyes should be stressed.

—Skin disease: Methyl alcohol is a defatting agent and can cause dermatitis on prolonged exposure. Persons with pre-existing skin disorders may be susceptible to the effects of this agent.

—Liver function tests: Methyl alcohol may cause liver damage. A profile of liver function should be obtained by utilizing a medically acceptable array of biochemical tests.

—Kidney disease: Although methyl alcohol has not been proven to be kidney toxin in humans, the importance of this organ in the elimination of toxic substances justifies special consideration in those with impaired renal function.

—Eye disease: Because methyl alcohol may cause optic atrophy and blindness, those with pre-existing eye diseases may be at increased risk from exposure.

2. Periodic Medical Examination: The aforementioned medical examinations should be repeated on an annual basis. In addition, anyone developing the above-listed conditions or who has been splashed in the eyes with,

These recommendations reflect good industrial hygiene and medical surveillance practices and their implementation will assist in achieving an effective occupational health program. However, they may not be sufficient to achieve compliance with all requirements of OSHA regulations.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service Centers for Disease Control
National Institute for Occupational Safety and Health

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

process of being installed, or when they fail and need to be supplemented. Respirators may also be used for operations which require entry into tanks or closed vessels, and in emergency situations. If the use of respirators is necessary, the only respirators permitted are those that have been approved by the Mine Safety and Health Administration (formerly Mining Enforcement and Safety Administration) or by the National Institute for Occupational Safety and Health.

- In addition to respirator selection, a complete respiratory protection program should be instituted which includes regular training, maintenance, inspection, cleaning, and evaluation.

PERSONAL PROTECTIVE EQUIPMENT

- Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent repeated or prolonged skin contact with liquid methyl alcohol.
- Clothing wet with liquid methyl alcohol should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of methyl alcohol from the clothing. If the clothing is to be laundered or otherwise cleaned to remove the methyl alcohol, the person performing the operation should be informed of methyl alcohol's hazardous properties.
- Any clothing which becomes wet with liquid methyl alcohol should be removed immediately and not reworn until the methyl alcohol is removed from the clothing.
- Employees should be provided with and required to use splash-proof safety goggles where liquid methyl alcohol may contact the eyes.

SANITATION

- Skin that becomes wet with liquid methyl alcohol should be promptly washed or showered to remove any methyl alcohol.
- Eating and smoking should not be permitted in areas where liquid methyl alcohol is handled, processed, or stored.

COMMON OPERATIONS AND CONTROLS

The following list includes some common operations in which exposure to methyl alcohol may occur and control methods which may be effective in each case:

| Operation | Controls |
|--|--|
| Liberation during application of surface coatings such as shellac, wood dyes, nitrocellulose lacquers, water-proofing formulations, and phenolic resins | Local exhaust ventilation; general dilution ventilation; personal protective equipment |
| Use as a solvent for rotogravure inks, aniline dyes, and duplicator fluids | General dilution ventilation |
| Liberation during manual application of methanol as a cleaner for coated surfaces, leather, gloves, and metal and resins surfaces prior to further treatment | General dilution ventilation; personal protective equipment |
| Liberation during manufacture of formaldehyde by oxidation or dehydrogenation | Local exhaust ventilation; general dilution ventilation |
| Use in plastics industry to produce plasticizers, softening agents, and acrylic resins | Local exhaust ventilation; general dilution ventilation; personal protective equipment |
| Liberation during use as an intermediate in the preparation of methacrylates, methyl chlorides, methyl ethers, dimethyl sulfate, methyl formate, and methyl bromide | Local exhaust ventilation; general dilution ventilation; personal protective equipment |
| Liberation during application as an extractant in industrial chemical processes such as refinery gasoline and oils and purifying pharmaceuticals such as steroids and hormones | Local exhaust ventilation; general dilution ventilation |
| Use as a solvent in rubber industry | Local exhaust ventilation; general dilution ventilation; personal protective equipment |

RESPIRATORY PROTECTION FOR METHYL ALCOHOL

| Condition | Minimum Respiratory Protection* Required Above 200 ppm |
|---|---|
| Vapor Concentration | |
| 2000 ppm or less | Any supplied-air respirator. Any self-contained breathing apparatus. |
| 10,000 ppm or less | Any supplied-air respirator with a full facepiece, helmet, or hood. Any self-contained breathing apparatus with a full facepiece. |
| 25,000 ppm or less | A Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode or with a full facepiece, helmet, or hood operated in continuous-flow mode. |
| Greater than 25,000 ppm or entry and escape from unknown concentrations | Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. A combination respirator which includes a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure or continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode. |
| Fire Fighting | Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. |
| Escape | Any escape self-contained breathing apparatus. |

*Only NIOSH-approved or MSHA-approved equipment should be used.

 * TRADE NAMES *
 *
 * Canadian Centre for Occupational Health and Safety *

 *** IDENTIFICATION ***

RECORD NUMBER : 240411
 LANGUAGE : ENGLISH
 TRADE NAME(S) : NITRIC ACID
 PRODUCT IDENTIFICATION DATA : J.T. BAKER MSDS NUMBER: N3660 PRODUCT CODES:
 9597,6901,9602,9616,9605,5113,5371,4801,9604,960
 1,9600,9606 9598
 DATE OF MSDS : 1989-05-01

*** MANUFACTURER INFORMATION ***

MANUFACTURER : J T BAKER CHEMICAL CO
 ADDRESS : 222 RED SCHOOL LANE
 PHILLIPSBURG NEW JERSEY
 U.S.A. 08865
 EMERGENCY TELEPHONE NO.(S) : 201-859-2151
 800-424-9300 (CHEMTREC)
 800-424-8802 (NATIONAL RESPONSE CENTER)

*** MATERIAL SAFETY DATA ***

J.T.BAKER INC. 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865
 MATERIAL SAFETY DATA SHEET
 24-HOUR EMERGENCY TELEPHONE -- (201) 859-2151
 CHEMTREC # (800) 424-9300 -- NATIONAL RESPONSE CENTER # (800) 424-8802

N3660 M04
 EFFECTIVE: 05/01/89

NITRIC ACID

PAGE: 1
 ISSUED: 07/21/90

J.T.BAKER INC., 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: NITRIC ACID
 COMMON SYNONYMS: HYDROGEN NITRATE; AZOTIC ACID
 CHEMICAL FAMILY: INORGANIC ACIDS
 FORMULA: HNO3
 FORMULA WT.: 63.01
 CAS NO.: 7697-37-2
 NIOSH/RTECS NO.: Q05775000
 PRODUCT USE: LABORATORY REAGENT
 PRODUCT CODES: 9597,6901,9602,9616,9605,5113,5371,4801,9604,9601,9600,9606
 9598

PRECAUTIONARY LABELING

BAKER SAF-T-DATA* SYSTEM

| | | | |
|--------------|---|---|---------------------|
| HEALTH | - | 3 | SEVERE (POISON) |
| FLAMMABILITY | - | 0 | NONE |
| REACTIVITY | - | 3 | SEVERE (OXIDIZER) |
| CONTACT | - | 4 | EXTREME (CORROSIVE) |

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

U.S. PRECAUTIONARY LABELING

POISON DANGER

SPILLAGE MAY CAUSE FIRE OR LIBERATE DANGEROUS GAS. HARMFUL IF INHALED AND MAY CAUSE DELAYED LUNG INJURY. STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. LIQUID AND VAPOR CAUSE SEVERE BURNS. MAY BE FATAL IF SWALLOWED OR INHALED.

KEEP FROM CONTACT WITH CLOTHING AND OTHER COMBUSTIBLE MATERIALS. DO NOT STORE NEAR COMBUSTIBLE MATERIALS. DO NOT GET IN EYES, ON SKIN, ON CLOTHING. DO NOT BREATHE VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, USE WATER SPRAY. IN CASE OF SPILL, NEUTRALIZE WITH SODA ASH OR LIME.

CONTINUED ON PAGE: 2

J.T.BAKER INC. 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865

M A T E R I A L S A F E T Y D A T A S H E E T

24-HOUR EMERGENCY TELEPHONE -- (201) 859-2151

CHEMTREC # (800) 424-9300 -- NATIONAL RESPONSE CENTER # (800) 424-8802

NJ660 M04

EFFECTIVE: 05/01/89

NITRIC ACID

PAGE: 2
ISSUED: 07/21/90

PRECAUTIONARY LABELING (CONTINUED)

INTERNATIONAL LABELING

CAUSES SEVERE BURNS.

KEEP OUT OF REACH OF CHILDREN. DO NOT BREATHE VAPOUR. IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF WATER AND SEEK MEDICAL ADVICE. TAKE OFF IMMEDIATELY ALL CONTAMINATED CLOTHING.

SAF-T-DATA* STORAGE COLOR CODE: YELLOW (REACTIVE)

SECTION II - COMPONENTS

| COMPONENT | CAS NO. | WEIGHT % | OSHA/PEL | ACGIH/TLV |
|-------------|-----------|----------|----------|-----------|
| NITRIC ACID | 7697-37-2 | 65-71 | 2 PPM | 2 PPM |
| WATER | 7732-18-5 | 29-35 | N/E | N/E |

SECTION III - PHYSICAL DATA

BOILING POINT: 121 C (249 F)
(AT 760 MM HG) VAPOR PRESSURE (MMHG): 9
(20 C)

MELTING POINT: -42 C (-43 F)
(AT 760 MM HG) VAPOR DENSITY (AIR=1): N/A

SPECIFIC GRAVITY: 1.41
(H2O=1) EVAPORATION RATE: N/A

SOLUBILITY(H2O): COMPLETE (100%) % VOLATILES BY VOLUME: 100
(21 C)

PH: 1.0 (0.1M SOLUTION)

ODOR THRESHOLD (P.P.M.): N/A PHYSICAL STATE: LIQUID

COEFFICIENT WATER/OIL DISTRIBUTION: N/A

APPEARANCE & ODOR: CLEAR, COLORLESS LIQUID. SUFFOCATING ODOR.

CONTINUED ON PAGE: 3

J.T.BAKER INC. 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865
M A T E R I A L S A F E T Y D A T A S H E E T
24-HOUR EMERGENCY TELEPHONE -- (201) 859-2151
CHEMTREC # (800) 424-9300 -- NATIONAL RESPONSE CENTER # (800) 424-8802

N3660 M04
EFFECTIVE: 05/01/89

NITRIC ACID

PAGE: 3
ISSUED: 07/21/90

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP): N/A NFPA 704M RATING: 3-0-0 OXY

AUTOIGNITION TEMPERATURE: N/A

FLAMMABLE LIMITS: UPPER - N/A LOWER - N/A

FIRE EXTINGUISHING MEDIA
USE WATER SPRAY.

SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE EXPOSED CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL; DO NOT GET WATER INSIDE CONTAINERS.

UNUSUAL FIRE & EXPLOSION HAZARDS

STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. REACTS WITH MOST METALS TO PRODUCE HYDROGEN GAS, WHICH CAN FORM AN EXPLOSIVE MIXTURE WITH AIR. A VIOLENT EXOTHERMIC REACTION OCCURS WITH WATER. SUFFICIENT HEAT MAY BE PRODUCED TO IGNITE COMBUSTIBLE MATERIALS.

TOXIC GASES PRODUCED

OXIDES OF NITROGEN, HYDROGEN

EXPLOSION DATA-SENSITIVITY TO MECHANICAL IMPACT

NONE IDENTIFIED.

EXPLOSION DATA-SENSITIVITY TO STATIC DISCHARGE

NONE IDENTIFIED.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 5 MG/M3 (2 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 10 MG/M3 (4 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 5 MG/M3 (2 PPM)

CONTINUED ON PAGE: 4

J.T.BAKER INC. 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865

M A T E R I A L S A F E T Y D A T A S H E E T

24-HOUR EMERGENCY TELEPHONE -- (201) 859-2151

CHEMTREC # (800) 424-9300 -- NATIONAL RESPONSE CENTER # (800) 424-8802

N3660 M04

NITRIC ACID

EFFECTIVE: 05/01/89

PAGE: 4

ISSUED: 07/21/90

SECTION V - HEALTH HAZARD DATA (CONTINUED)

TOXICITY OF COMPONENTS

INHALATION-1HR RAT LC50 FOR NITRIC ACID

2500 PPM

INTRAPERITONEAL MOUSE LD50 FOR WATER

190 G/KG

INTRAVENOUS MOUSE LD50 FOR WATER

25 G/KG

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. VENTILATE AREA. NEUTRALIZE SPILL WITH SODA ASH OR LIME. WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.

KEEP COMBUSTIBLES (WOOD, PAPER, OIL, ETC.) AWAY FROM SPILLED MATERIAL.

J. T. BAKER NEUTRASORB(R) OR TEAM(R) 'LOW NA-' ACID NEUTRALIZERS ARE FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: D001, D002 (IGNITABLE, CORROSIVE WASTE)

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 100 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ACID CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, NEOPRENE GLOVES ARE RECOMMENDED.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA* STORAGE COLOR CODE: YELLOW (REACTIVE)

STORAGE REQUIREMENTS

KEEP CONTAINER TIGHTLY CLOSED. STORE SEPARATELY AND AWAY FROM FLAMMABLE AND COMBUSTIBLE MATERIALS. ISOLATE FROM INCOMPATIBLE MATERIALS. KEEP PRODUCT OUT OF LIGHT.

CONTINUED ON PAGE: 7

J.T.BAKER INC. 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865
M A T E R I A L S A F E T Y D A T A S H E E T
24-HOUR EMERGENCY TELEPHONE -- (201) 859-2151
CHEMTREC # (800) 424-9300 -- NATIONAL RESPONSE CENTER # (800) 424-8802

N3660 M04
EFFECTIVE: 05/01/89

NITRIC ACID

PAGE: 7
ISSUED: 07/21/90

INGESTION: CALL A PHYSICIAN. IF SWALLOWED, DO NOT INDUCE VOMITING. IF CONSCIOUS, GIVE WATER, MILK, OR MILK OF MAGNESIA.

INHALATION: IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

SKIN CONTACT: IN CASE OF CONTACT, IMMEDIATELY FLUSH SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. WASH CLOTHING BEFORE RE-USE.

EYE CONTACT: IN CASE OF EYE CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

SARA/TITLE III HAZARD CATEGORIES AND LISTS

ACUTE: YES CHRONIC: YES FLAMMABILITY: YES PRESSURE: NO REACTIVITY: NO

EXTREMELY HAZARDOUS SUBSTANCE: YES CONTAINS NITRIC ACID (RQ = 1,000 LBS, TPQ = 1,000 LBS)

CERCLA HAZARDOUS SUBSTANCE: YES CONTAINS NITRIC ACID (RQ = 1000 LBS)

SARA 313 TOXIC CHEMICALS: YES CONTAINS NITRIC ACID

GENERIC CLASS: C16

TSCA INVENTORY: YES

SECTION VI - REACTIVITY DATA

STABILITY: STABLE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, LIGHT, MOISTURE

INCOMPATIBLES: STRONG BASES, CARBONATES, SULFIDES, CYANIDES, COMBUSTIBLE MATERIALS, ORGANIC MATERIALS, STRONG REDUCING AGENTS, MOST COMMON METALS, POWDERED METALS, CARBIDES, AMMONIUM HYDROXIDE, WATER, ALCOHOLS

DECOMPOSITION PRODUCTS: OXIDES OF NITROGEN, HYDROGEN

CONTINUED ON PAGE: 6

J.T.BAKER INC. 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865

M A T E R I A L S A F E T Y D A T A S H E E T

24-HOUR EMERGENCY TELEPHONE -- (201) 859-2151

CHEMTREC # (800) 424-9300 -- NATIONAL RESPONSE CENTER # (800) 424-8802

N3660 M04

NITRIC ACID

PAGE: 6

EFFECTIVE: 05/01/89

ISSUED: 07/21/90

SECTION VII - SPILL & DISPOSAL PROCEDURES

CARCINOGENICITY: NTP: NO IARC: NO LIST: NO OSHA REG: NO

CARCINOGENICITY

NONE IDENTIFIED.

REPRODUCTIVE EFFECTS

NONE IDENTIFIED.

EFFECTS OF OVEREXPOSURE

INHALATION: SEVERE IRRITATION OR BURNS OF RESPIRATORY SYSTEM, COUGHING, DIFFICULT BREATHING, CHEST PAINS, PULMONARY EDEMA, LUNG INFLAMMATION, UNCONSCIOUSNESS, AND MAY BE FATAL

SKIN CONTACT: SEVERE IRRITATION OR BURNS

EYE CONTACT: SEVERE IRRITATION OR BURNS

SKIN ABSORPTION: NONE IDENTIFIED

INGESTION: NAUSEA, VOMITING, SEVERE BURNS, ULCERATION - MOUTH, THROAT, STOMACH, AND MAY BE FATAL

CHRONIC EFFECTS: DAMAGE TO LUNGS, TEETH

TARGET ORGANS

EYES, SKIN, MUCOUS MEMBRANES, RESPIRATORY SYSTEM, LUNGS, TEETH, GI TRACT

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

DAMAGED SKIN, EYE DISORDERS, CARDIOPULMONARY DISEASE, LUNG DISEASE

PRIMARY ROUTES OF ENTRY

INHALATION, INGESTION, EYE CONTACT, SKIN CONTACT

CONTINUED ON PAGE: 5

J.T.BAKER INC. 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865

M A T E R I A L S A F E T Y D A T A S H E E T

24-HOUR EMERGENCY TELEPHONE -- (201) 859-2151

CHEMTREC # (800) 424-9300 -- NATIONAL RESPONSE CENTER # (800) 424-8802

N3660 M04

NITRIC ACID

PAGE: 5

EFFECTIVE: 05/01/89

ISSUED: 07/21/90

SECTION V - HEALTH HAZARD DATA (CONTINUED)

EMERGENCY AND FIRST AID PROCEDURES

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME: NITRIC ACID (OVER 40%)
HAZARD CLASS: OXIDIZER
UN/NA: UN2031 REPORTABLE QUANTITY: 1000 LBS.
LABELS: OXIDIZER, CORROSIVE
REGULATORY REFERENCES: 49CFR 172.101; 173.268

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME: NITRIC ACID
HAZARD CLASS: 8 I.M.O. PAGE: 8185
UN: UN2031 MARINE POLLUTANTS: NO PACKAGING GROUP: II
LABELS: CORROSIVE
REGULATORY REFERENCES: 49CFR 172.102; PART 176; IMO

AIR (I.C.A.O.)

PROPER SHIPPING NAME: NITRIC ACID
HAZARD CLASS: 8
UN: UN2031 PACKAGING GROUP: II
LABELS: CORROSIVE
REGULATORY REFERENCES: 49CFR 172.101; 173.6; PART 175; ICAO/IATA

U.S. CUSTOMS HARMONIZATION NUMBER: 28080000000

N/A = NOT APPLICABLE OR NOT AVAILABLE
N/E = NOT ESTABLISHED

THE INFORMATION IN THIS MATERIAL SAFETY DATA SHEET MEETS THE REQUIREMENTS OF THE UNITED STATES OCCUPATIONAL SAFETY AND HEALTH ACT AND REGULATIONS PROMULGATED THEREUNDER (29 CFR 1910.1200 ET. SEQ.) AND THE CANADIAN WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM. THIS DOCUMENT IS INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF THE MATERIAL BY A PERSON TRAINED IN, OR SUPERVISED BY A PERSON TRAINED IN, CHEMICAL HANDLING. THE USER IS RESPONSIBLE FOR DETERMINING THE PRECAUTIONS AND DANGERS OF THIS CHEMICAL FOR HIS OR HER PARTICULAR APPLICATION. DEPENDING ON USAGE, PROTECTIVE CLOTHING INCLUDING EYE AND FACE GUARDS AND RESPIRATORS MUST BE USED TO AVOID CONTACT WITH MATERIAL OR BREATHING CHEMICAL VAPORS/FUMES.

EXPOSURE TO THIS PRODUCT MAY HAVE SERIOUS ADVERSE HEALTH EFFECTS. THIS CHEMICAL MAY INTERACT WITH OTHER SUBSTANCES. SINCE THE POTENTIAL USES

CONTINUED ON PAGE: 8

J.T.BAKER INC. 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865
M A T E R I A L S A F E T Y D A T A S H E E T
24-HOUR EMERGENCY TELEPHONE — (201) 859-2151
CHEMTREC # (800) 424-9300 -- NATIONAL RESPONSE CENTER # (800) 424-8802

NJ660 M04
EFFECTIVE: 05/01/89

NITRIC ACID

PAGE: 8
ISSUED: 07/21/90

ARE SO VARIED, BAKER CANNOT WARN OF ALL OF THE POTENTIAL DANGERS OF USE OR INTERACTION WITH OTHER CHEMICALS OR MATERIALS. BAKER WARRANTS THAT THE CHEMICAL MEETS THE SPECIFICATIONS SET FORTH ON THE LABEL. BAKER DISCLAIMS ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED WITH REGARD TO THE PRODUCT SUPPLIED HEREUNDER, ITS MERCHANTABILITY OR ITS FITNESS FOR A PARTICULAR PURPOSE.

THE USER SHOULD RECOGNIZE THAT THIS PRODUCT CAN CAUSE SEVERE INJURY AND EVEN DEATH, ESPECIALLY IF IMPROPERLY HANDLED OR THE KNOWN DANGERS OF USE ARE NOT HEEDDED. READ ALL PRECAUTIONARY INFORMATION. AS NEW DOCUMENTED GENERAL SAFETY INFORMATION BECOMES AVAILABLE, BAKER WILL PERIODICALLY REVISE THIS MATERIAL SAFETY DATA SHEET. IF YOU HAVE ANY QUESTIONS, PLEASE CALL CUSTOMER SERVICE (1-800-JTBAKER) FOR ASSISTANCE.

COPYRIGHT 1990 J.T.BAKER INC.
* TRADEMARKS OF J.T.BAKER INC.

APPROVED BY QUALITY ASSURANCE DEPARTMENT.

-- LAST PAGE --

- Topic: SODIUM HYDROXIDE

VERVIEW

- Material name:
SODIUM HYDROXIDE

Common synonyms:

- Caustic soda
Lye

Characteristics:

- Solid flakes or pellets White Odorless
Sinks and mixes with water.

Emergency actions:

- Avoid contact with solid and dust. Keep people away.
- Wear rubber overclothing (including gloves).
Stop discharge if possible.
Isolate and remove discharged material.
- Notify local health and pollution control agencies.

Fire:

- Not flammable.
May cause fire on contact with combustibles.
- Flammable gas may be produced on contact with metals.
Wear rubber overclothing (including gloves).
Flood discharge area with water.
- Cool exposed containers with water.

Exposure:

- CALL FOR MEDICAL AID.
- DUST
Irritating to eyes, nose and throat.
Move to fresh air.
If breathing has stopped, give artificial respiration.
If breathing is difficult, give oxygen.
IF IN EYES, hold eyelids open and flush with plenty of water.
- SOLID
Will burn skin and eyes.
Harmful if swallowed.
- Remove contaminated clothing and shoes.
Flush affected areas with plenty of water.
IF IN EYES, hold eyelids open and flush with plenty of water.
- IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk.
- DO NOT INDUCE VOMITING.

Water pollution:

- Dangerous to aquatic life in high concentrations.
- May be dangerous if it enters water intakes.
Notify local health and wildlife officials.
Notify operators of nearby water intakes.

- RESPONSE TO DISCHARGE

- Issue warning-corrosive Restrict access Disperse and flush

BEL

- Category: Corrosive

- Class: 8

HEMICAL DESIGNATIONS

- G compatibility class: Caustics

- Formula: NaOH

Topic: SODIUM HYDROXIDE

IMO/UN designation: 8.0/1823

DOT id no.: 1823

CAS registry no.: 1310-73-2

OBSERVABLE CHARACTERISTICS

Physical state: Solid

Color: White

Odor: Odorless

HEALTH HAZARDS

Personal protective equipment: Chemical safety goggles;
face shield; filter or dust-type respirator; rubber boots;
rubber gloves.

Symptoms following exposure: Strong corrosive action on
contacted tissues. INHALATION: dust may cause damage to
upper respiratory tract and lung itself, producing from
mild nose irritation to pneumonitis. INGESTION: severe
damage to mucous membranes; severe scar formation or
perforation may occur. EYE CONTACT: produces severe damage.

Treatment of exposure: INHALATION: remove from exposure;
support respiration; call physician. INGESTION: give water
or milk followed by dilute vinegar or fruit juice; do NOT
induce vomiting. SKIN: wash immediately with large
quantities of water under emergency safety shower while
removing clothing; continue washing until medical help
arrives; call physician. EYES: irrigate immediately with
copious amounts of water for at least 15 min.; call
physician.

Threshold limit value: 2 mg/m(3)

Short term inhalation limits: Not pertinent

Toxicity by ingestion: (10% solution) oral rabbit LDLo =
500 mg/kg

Late toxicity: None

Vapor (gas) irritant characteristics: Non-volatile

Liquid or solid irritant characteristics: Severe skin
irritant. Causes second-and third-degree burns on short
contact and is very injurious to the eyes.

Odor threshold: Not pertinent

IDLH value: 200 mg/m(3)

FIRE HAZARDS

Flash point: Not flammable

Flammable limits in air: Not flammable

Fire extinguishing agents: Not pertinent

Fire extinguishing agents NOT to be used: Not pertinent

Special hazards of combustion products: Not pertinent

Behavior in fire: Not pertinent

Ignition temperature: Not flammable

Electrical hazard: Not pertinent

Burning rate: Not flammable

Adiabatic flame temperature: Data not available

Stoichiometric air to fuel ratio: Data not available

Flame temperature: Data not available

CHEMICAL REACTIVITY

Reactivity with water: Dissolves with liberation of much
heat; may steam and splatter

Reactivity with common materials: When wet, attacks metals
such as aluminum, tin, lead, and zinc to produce flammable

Topic: SODIUM HYDROXIDE

IMO/UN designation: 8.0/1823

DOT id no.: 1823

CAS registry no.: 1310-73-2

OBSERVABLE CHARACTERISTICS

Physical state: Solid

Color: White

Odor: Odorless

HEALTH HAZARDS

Personal protective equipment: Chemical safety goggles; face shield; filter or dust-type respirator; rubber boots; rubber gloves.

Symptoms following exposure: Strong corrosive action on contacted tissues. INHALATION: dust may cause damage to upper respiratory tract and lung itself, producing from mild nose irritation to pneumonitis. INGESTION: severe damage to mucous membranes; severe scar formation or perforation may occur. EYE CONTACT: produces severe damage.

Treatment of exposure: INHALATION: remove from exposure; support respiration; call physician. INGESTION: give water or milk followed by dilute vinegar or fruit juice; do NOT induce vomiting. SKIN: wash immediately with large quantities of water under emergency safety shower while removing clothing; continue washing until medical help arrives; call physician. EYES: irrigate immediately with copious amounts of water for at least 15 min.; call physician.

Threshold limit value: 2 mg/m(3)

Short term inhalation limits: Not pertinent

Toxicity by ingestion: (10% solution) oral rabbit LDLo = 500 mg/kg

Late toxicity: None

Vapor (gas) irritant characteristics: Non-volatile

Liquid or solid irritant characteristics: Severe skin irritant. Causes second-and third-degree burns on short contact and is very injurious to the eyes.

Odor threshold: Not pertinent

IDLH value: 200 mg/m(3)

FIRE HAZARDS

Flash point: Not flammable

Flammable limits in air: Not flammable

Fire extinguishing agents: Not pertinent

Fire extinguishing agents NOT to be used: Not pertinent

Special hazards of combustion products: Not pertinent

Behavior in fire: Not pertinent

Ignition temperature: Not flammable

Electrical hazard: Not pertinent

Burning rate: Not flammable

Adiabatic flame temperature: Data not available

Stoichiometric air to fuel ratio: Data not available

Flame temperature: Data not available

CHEMICAL REACTIVITY

Reactivity with water: Dissolves with liberation of much heat; may steam and splatter

Reactivity with common materials: When wet, attacks metals such as aluminum, tin, lead, and zinc to produce flammable

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: SULFURIC ACID

1.0 IDENTIFIERS

CAS Number: 7664-93-9

DOT Number: UN 1830

RTK Substance number: 1761

Date: January 1986

2.0 HAZARD SUMMARY

- * Sulfuric Acid can affect you when breathed in.
- * Sulfuric Acid is a CORROSIVE CHEMICAL and can severely burn the skin and eyes. It can cause third-degree skin burns and blindness on contact.
- * Exposure to mist can irritate the eyes, nose, throat, and lungs, causing coughing, chest tightness and sneezing. Higher levels can cause a build-up of fluid in the lungs, (pulmonary edema) which can be fatal.
- * Repeated exposures can cause permanent lung damage and damage teeth.
- * Sulfuric Acid is a REACTIVE CHEMICAL and is an EXPLOSION HAZARD.

IDENTIFICATION

Sulfuric Acid is an oily liquid. It is used in fertilizers, chemicals, dyes, petroleum refining, etching, analytical chemistry and in making iron, steel and industrial explosives.

REASON FOR CITATION

- * Sulfuric Acid is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT and NIOSH and EPA.
- * This chemical is also on the Special Health Hazard Substance List because it is REACTIVE and CORROSIVE.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

- * Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.20.
- * If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is 1 mg/m3 averaged over an 8-hour workshift.

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

- Topic: SULFURIC ACID

NIOSH: The recommended airborne exposure limit is 1 mg/m3 averaged over a 10-hour workshift.

ACGIH: The recommended airborne exposure limit is 1 mg/m3 averaged over an 8-hour workshift.

WAYS OF REDUCING EXPOSURE

- * Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- * Wear protective work clothing.
- * Wash thoroughly immediately after exposure to Sulfuric Acid and at the end of the workshift.
- * Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of Sulfuric Acid to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

3.0 HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to Sulfuric Acid:

- * Contact can severely burn the skin and eyes causing permanent damage.
- * Exposure to Sulfuric Acid mist or fumes can irritate the eyes, causing tearing; the nose and throat causing sneezing; and can irritate the lungs causing chest tightness, coughing and shortness of breath.
- * High levels can burn the lungs and cause a build-up of fluid (pulmonary edema). This can cause death.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to Sulfuric Acid and can last for months or years:

Cancer Hazard

- * According to the information presently available to the New Jersey Department of Health, Sulfuric Acid has not been tested for its ability to cause cancer in animals.

CHEMICAL NAME
TOLUENE

FORMULA
C7H8

SYNONYMS
TOLUOL
METHYL BENZENE
NCI-C07272
PHENYL METHANE
METHACIDE
METHYLBENZOL
ANTISAL 1A
UN 1294
BENZENE, METHYL-
METHANE, PHENYL-
METHYLBENZENE
PHENYLMETHANE
OHS23590

PERMISSIBLE EXPOSURE LIMIT
200 PPM OSHA TWA - 300 PPM OSHA CEILING
500 PPM OSHA 10 MINUTE PEAK
100 PPM ACGIH TWA (SKIN NOTATION)
150 PPM ACGIH STEL
100 PPM NIOSH RECOMMENDED TWA
200 PPM NIOSH RECOMMENDED 10 MINUTE CEILING
EXPERIMENTAL CARCINOGEN (NTP)
ANIMAL TERATOGEN (RTEC) - POSITIVE MUTAGEN (RTEC)
REPORTABLE QUANTITIES - 1000 LB CWA 311(B)(4) - 1 LB CWA 307(A) -
1 LB RCRA 3001 - 1 LB PROPOSED RQ
CERCLA HAZARD RATINGS - TOXICITY 2 - IGNITABILITY 3 - REACTIVITY 0 -
PERSISTENCE 1

TOXICOLOGY: ACUTE POISONING VIA INHALATION OR INGESTION DEPRESSES THE CENTRAL NERVOUS SYSTEM, LEADING TO COMA. LIVER AND KIDNEY DAMAGE IS POSSIBLE. CARDIAC SENSITIZATION HAS BEEN REPORTED.

CHRONIC EXPOSURE DEPRESSES THE BONE MARROW, BUT WITHOUT THE SEVERE OR FATAL DAMAGE PRESENT IN BENZENE POISONING.

PROLONGED SKIN CONTACT CAUSES DEFATTING, LEADING TO DERMATITIS. EYE AND RESPIRATORY IRRITATION OCCURS AT ELEVATED CONCENTRATIONS.

THE ODOR THRESHOLD IS BELOW THE PERMISSIBLE EXPOSURE LIMIT, THUS TOLUENE IS CONSIDERED TO HAVE GOOD WARNING PROPERTIES.

IHL-HMN TCLO: 200 PPM
IHL-MAN TCLO: 100 PPM
IHL-RAT LCLO: 4000 PPM/4 HR
IHL-MUS LC50: 5320 PPM/8 HR
ORL-RAT LD50: 5000 MG/KG
SKN-RBT LD50: 14 GM/KG

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONCENTRATION
2000 PPM
OSHA/NIOSH

PHYSICAL DESCRIPTION
COLORLESS LIQUID, BENZENE-LIKE ODOR.

CHEMICAL AND PHYSICAL PROPERTIES

MOLECULAR WEIGHT: 92
BOILING POINT AT 1 ATM, F: 231 F
SOLUBILITY IN WATER, G/100 G WATER AT 20C: 0.05 G
FLASH POINT, CLOSED CUP, F (OR OPEN CUP IF 0C): 40 F
VAPOR PRESSURE @ 20 C, MMHG: 22 MM
MELTING POINT, F: -139 F
UPPER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: 7.1%
LOWER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: 1.3%
AUTOIGNITION TEMPERATURE: 896 F
SPECIFIC GRAVITY: 0.866
VAPOR DENSITY (AIR=1): 3.2
ODOR THRESHOLD: 2 PPM
OCTANOL/WATER PARTITION COEFFICIENT: 2.69

INCOMPATIBILITIES

STRONG OXIDIZERS
NITRIC ACID
SULFURIC ACID
OXYGEN
PEROXIDES
DUST/VAPORS MAY FORM EXPLOSIVE MIXTURE WITH AIR
HEAT
THERMAL DECOMPOSITION PRODUCTS ARE HAZARDOUS AND/OR TOXIC
PLASTICS

PERSONAL PROTECTIVE EQUIPMENT

FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES
FOR CHEMICAL HAZARDS":

PREVENT REPEATED OR PROLONGED SKIN CONTACT
WEAR IMPERVIOUS CLOTHING
WEAR GLOVES
WEAR FACESHIELD (8 INCH MINIMUM)

PLACE CONTAMINATED CLOTHING IN CLOSED CONTAINERS FOR STORAGE UNTIL
LAUNDERED OR DISCARDED

IF CLOTHING IS TO BE LAUNDERED, INFORM PERSON PERFORMING OPERATION OF
CONTAMINANT'S HAZARDOUS PROPERTIES

— — —

ACGIH "GUIDELINES FOR SELECTION OF CHEMICAL PROTECTIVE CLOTHING" INDICATES THE FOLLOWING MATERIALS AND PROTECTIVE RATINGS BY INDEPENDENT VENDORS AGAINST TOLUENE:

EXCELLENT/GOOD:

VITON

FLUORINE/CHLOROPRENE

GOOD/FAIR:

POLYURETHANE

POLYVINYL ALCOHOL

NEOPRENE/STYRENE-BUTADIENE RUBBER

NITRILE RUBBER

CHLORINATED POLYETHYLENE

STYRENE-BUTADIENE RUBBER

SARANEX

FAIR/POOR:

BUTYL RUBBER

NATURAL RUBBER

NEOPRENE

NITRILE/POLYVINYL CHLORIDE

POLYETHYLENE

POLYVINYL CHLORIDE

GOGGLES

PREVENT ANY POSSIBILITY OF EYE CONTACT

WEAR FACE SHIELD OR VENTED GOGGLES

WASHING CHEMICALS FROM THE SKIN

PROMPTLY WHEN SKIN BECOMES CONTAMINATED

NO STANDARD REQUIREMENT, BUT ADVISE WASHING

SHOWER AT END OF EACH SHIFT

ROUTINE CHANGING OF WORK CLOTHING

NO STANDARD REQUIREMENT, BUT ADVISE CHANGING

IF THERE IS ANY POSSIBILITY THAT CLOTHING MAY BE CONTAMINATED

CLOTHING REMOVAL FOLLOWING ACCIDENTAL CONTAMINATION

IMMEDIATELY IF IT BECOMES CONTAMINATED TO PREVENT FLAMMABILITY/EXPLOS-
IVITY HAZARD

NO STANDARD REQUIREMENT, BUT ADVISE REMOVING

SHOWER AFTER EACH SHIFT PRIOR TO LEAVING PREMISES

DRY SWEEPING AREA OR DRY MOPPING PROHIBITED - CARCINOGEN

SPECIFIC EMERGENCY PROVISIONS

NO NIOSH/OSHA DATA, ADVISE:

EYE-WASH FOUNTAIN WITHIN IMMEDIATE WORK AREA WHERE EMPLOYEES' EYES MAY BE EXPOSED TO SUBSTANCE

QUICK DRENCHING FACILITIES WITHIN IMMEDIATE WORK AREA WHERE EMPLOYEES MAY BE EXPOSED TO SUBSTANCE

EATING AND SMOKING SHOULD NOT BE PERMITTED IN IMMEDIATE WORK AREA

WATER FOUNTAIN PROHIBITED IN WORK AREA

CLOSED SYSTEM IF SUBSTANCE TO BE USED

RESPIRATOR SELECTION (UPPER LIMIT DEVICES PERMITTED)

500 PPM

- CHEMICAL CARTRIDGE RESPIRATOR
WITH AN ORGANIC VAPOR CARTRIDGE
- SUPPLIED-AIR RESPIRATOR
- SELF-CONTAINED BREATHING APPARATUS

1000 PPM

- CHEMICAL CARTRIDGE RESPIRATOR
WITH AN ORGANIC VAPOR CARTRIDGE
WITH A FULL FACE-PIECE

2000 PPM

- GAS MASK
WITH AN ORGANIC VAPOR CANISTER
(CHIN-STYLE OR FRONT- OR BACK-MOUNTED CANISTER)
- SUPPLIED-AIR RESPIRATOR
WITH A FULL FACE-PIECE, HELMENT, OR HOOD
- SELF-CONTAINED BREATHING APPARATUS
WITH A FULL FACE-PIECE

>2000 PPM

- SELF-CONTAINED BREATHING APPARATUS
WITH A FULL FACE-PIECE
OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE
- TYPE 'C' SUPPLIED-AIR RESPIRATOR
WITH A FULL FACE-PIECE
OPERATED IN PRESSURE-DEMAND, POSITIVE-PRESSURE, OR CONTINUOUS-FLOW
MODE
AND
- AUXILIARY SELF-CONTAINED BREATHING APPARATUS
OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE

ESCAPE

- GAS MASK
WITH AN ORGANIC VAPOR CANISTER
(CHIN-STYLE OR FRONT- OR BACK-MOUNTED CANISTER)
- SELF-CONTAINED BREATHING APPARATUS

FIREFIGHTING

- SELF-CONTAINED BREATHING APPARATUS
WITH A FULL FACE-PIECE
OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE

ROUTE OF ENTRY INTO BODY

INHALATION
SKIN ABSORPTION
INGESTION
SKIN OR EYE CONTACT

SYMPTOMS

MUCOUS MEMBRANE IRRITATION
RESPIRATORY IRRITATION
SKIN IRRITATION
EYE IRRITATION
FATIGUE
WEAKNESS
EUPHORIA
CONFUSION
LACRIMATION
HEADACHE
DIZZINESS
SKIN IRRITATION
DROWSINESS
NUMBNESS
CONJUNCTIVITIS
ANOREXIA
WEIGHT LOSS
IRRITABILITY
TINNITUS
MUSCULAR FATIGUE
INSOMNIA
PARESTHESIA
DERMATITIS
PHOTOPHOBIA
REPRODUCTIVE EFFECTS IN EXPERIMENTAL ANIMALS
CENTRAL NERVOUS SYSTEM DEPRESSION
RESPIRATORY EDEMA
NUMBNESS EXTREMITIES
INCOORDINATION
TREMORS
COLLAPSE
ATAXIA
LEUKOPENIA
HEMATOPOIETIC BLOOD CHANGES
NAUSEA
KIDNEY DAMAGE

LIVER DAMAGE
FASCICULATION
KERATITIS
NERVOUSNESS
DILATED
CENTRAL NERVOUS SYSTEM DAMAGE

FIRST AID PROCEDURES FOLLOWING EXPOSURE

IF THIS CHEMICAL GETS INTO THE EYES, IMMEDIATELY WASH THE EYES WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING THE LOWER AND UPPER LIDS. GET MEDICAL ATTENTION IMMEDIATELY. CONTACT LENSES SHOULD NOT BE WORN WHEN WORKING WITH THIS CHEMICAL.

IF THIS CHEMICAL GETS ON THE SKIN, IMMEDIATELY WASH CONTAMINATED SKIN WITH SOAP OR MILD DETERGENT & WATER. IF THIS CHEMICAL SOAKS CLOTHING, IMMEDIATELY REMOVE CLOTHING & WASH SKIN WITH SOAP OR MILD DETERGENT & WATER. GET MEDICAL ATTENTION PROMPTLY.

IF A PERSON BREATHES IN LARGE AMOUNTS OF THIS CHEMICAL, MOVE THE EXPOSED PERSON TO FRESH AIR AT ONCE. IF BREATHING HAS STOPPED PERFORM ARTIFICIAL RESPIRATION. KEEP THE AFFECTED PERSON WARM AND AT REST. GET MEDICAL ATTENTION AS SOON AS POSSIBLE.

WHEN THIS CHEMICAL HAS BEEN SWALLOWED, DO NOT INDUCE VOMITING. REMOVE BY GASTRIC LAVAGE AND CATHARSIS.

BENZENE/TOLUENE/XYLENE EXPOSURE:

EMERGENCY TREATMENT - REMOVE FROM EXPOSURE. GIVE ARTIFICIAL RESPIRATION WITH OXYGEN. REMOVE BY GASTRIC LAVAGE. AVOID ASPIRATION.

FURTHER TREATMENT - CONTROL EXCITEMENT OR CONVULSIONS WITH DIAZEPAM, 0.1 MG/KG, SLOWLY INTRAVENOUSLY. KEEP PATIENT AT REST UNTIL RESPIRATION IS NORMAL. DO NOT GIVE EPINEPHRINE OR EPHEDRINE OR RELATED DRUGS. MONITOR ECG FOR VENTRICULAR ABNORMALITIES INDICATING CARDIAC ARREST.

SPECIAL TREATMENT - TREAT ANEMIA WITH REPEATED BLOOD TRANSFUSIONS. TREAT KIDNEY OR LIVER DAMAGE.

(MEDICATION MUST BE GIVEN BY QUALIFIED MEDICAL PERSONNEL)
(DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

GASTRIC LAVAGE - GIVE PATIENT GLASS OF WATER PRIOR TO PASSING OF STOMACH TUBE. LAY PATIENT ON ONE SIDE, WITH HEAD LOWER THAN WAIST. IMMOBILIZE A STRUGGLING PATIENT WITH A SHEET OR BLANKET. MEASURE DISTANCE ON TUBE FROM MOUTH TO EPIGASTRIUM, MARK TUBE WITH INDELIBLE MARKING OR TAPE. REMOVE DENTURES AND OTHER FOREIGN OBJECTS FROM MOUTH. OPEN MOUTH, USE GAG IF NECESSARY. EXTEND HEAD BY LIFTING THE CHIN. PASS TUBE OVER TONGUE AND TOWARD BACK OF THROAT WITHOUT EXTENDING HEAD OR NECK. IF OBSTRUCTION IS MET BEFORE THE MARK ON TUBE REACHES LEVELS OF TEETH, DO NOT FORCE, BUT REMOVE TUBE AND REPEAT PROCEDURE UNTIL TUBE PASSES TO MARK. PLACE END OF TUBE IN GLASS OF WATER. IF TUBE IS OBSTRUCTED WHEN INTRODUCED ABOUT HALFWAY TO THE MARK, IT MAY HAVE ENTERED TRACHEA.

AFTER TUBE IS PLACED IN STOMACH, ASPIRATE FIRST TO REMOVE STOMACH CONTENTS BY IRRIGATION SYRINGE. SAVE STOMACH CONTENTS FOR EXAMINATION, AND REPEAT INTRODUCTION AND WITHDRAWAL OF 100-300 ML WARM WATER UNTIL AT LEAST 3 LITERS OF CLEAR RETURN ARE OBTAINED. USE ACTIVATED CHARCOAL AT BEGINNING OF LAVAGE TO AID IN POISON INACTIVATION. LEAVE 50 GRAMS OF CHARCOAL SUSPENDED IN WATER IN THE STOMACH. IF INTRODUCTION AND REMOVAL OF LAVAGE FLUID BY GRAVITY REQUIRES MORE THAN FIVE MINUTES, ASSIST WITH ASEPTO SYRINGE. PREVENT ASPIRATION WITH CUFFED ENDOTRACHEAL TUBE. AVOID GIVING LARGE QUANTITIES OF WATER.

MASSAGE OF EPIGASTRIUM WHILE STOMACH TUBE IS BEING ASPIRATED MAY AID IN POISON REMOVAL.

IF PATIENT COMATOSE, INTUBATE TRACHEA WITH CUFFED ENDOTRACHEAL TUBE. SUCCINYLCHLORINE MAY BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL TO EASE INSERTION OF TRACHEAL CATHETER PRIOR TO PASSAGE OF STOMACH TUBE.

(DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

CONVULSIONS - GIVE ARTIFICIAL RESPIRATION BY MOUTH-TO-MOUTH INSUFFLATION. RESTRAIN THE PATIENT DURING CONVULSIONS TO PREVENT INJURY. DO NOT ATTEMPT EMESIS OR GASTRIC LAVAGE WHILE THE PATIENT IS TWITCHING OR HYPERIRRITABLE UNLESS THE AIRWAY IS CONTROLLED AND REMOVAL OF DRUG IS IMPERATIVE.

ADMINISTER ANTICONVULSANTS. MAINTAIN HYDRATION BY ORAL OR INTRAVENOUS FLUID ADMINISTRATION. MAINTAIN AN ADEQUATE AIRWAY. TREAT HYPOGLYCEMIA BY GIVING GLUCOSE. REDUCE ELEVATED TEMPERATURE BY USING TEPID SPONGES. REMOVE SECRETIONS FROM THE PHARYNX BY SUCTION. GIVE POSITIVE-PRESSURE RESPIRATION WITH OXYGEN DURING CONVULSIONS.

(DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

ACUTE RENAL FAILURE - TREAT SHOCK. FOR HEMOLYTIC REACTIONS, GIVE SODIUM BICARONATE, 5 G EVERY 1-2 HOURS AS NECESSARY TO MAINTAIN AN ALKALINE URINE.

(MEDICATION MUST BE GIVEN BY QUALIFIED MEDICAL PERSONNEL)

(DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

LIVER DAMAGE - REMOVE FROM EXPOSURE TO ALL CHEMICALS AND DRUGS. MAINTAIN COMPLETE BED REST. AVOID ANESTHESIA OR SURGICAL PROCEDURES. AVOID DEHYDRATION OR OVERHYDRATION. IF VOMITING SEVERE AND ORAL FLUIDS NOT RETAINED, REPLACE VOMITUS WITH AN EQUAL QUANTITY OF 100% DEXTROSE IN NORMAL SALINE. IN RENAL FUNCTION ADEQUATE, GIVE 1 LITER OF 5% DEXTROSE OR INVERT SUGAR IN NORMAL SALINE PLUS 1-3 LITERS OF 10% DEXTROSE OR INVERT SUGAR IN DISTILLED WATER INTRAVENOUSLY EVERY TWENTY-FOUR HOURS.

(DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

ORGANS

CENTRAL NERVOUS SYSTEM
LIVER
KIDNEYS
SKIN
EYES
REPRODUCTIVE SYSTEM
BONE MARROW
CARDIOVASCULAR SYSTEM
RESPIRATORY SYSTEM
MUCOUS MEMBRANES

STATUS OF REGULATORY ENFORCEMENT

OSHA STANDARD 29CFR1910.1200 HAZARD COMMUNICATION

REQUIRES CHEMICAL MANUFACTURERS AND IMPORTERS TO ASSESS THE HAZARDS OF CHEMICALS WHICH THEY PRODUCE OR IMPORT, AND ALL EMPLOYERS HAVING WORKPLACES IN THE MANUFACTURING DIVISION, STANDARD INDUSTRIAL CLASSIFICATION CODES 20 THROUGH 39, TO PROVIDE INFORMATION TO THEIR EMPLOYEES CONCERNING HAZARDOUS CHEMICALS BY MEANS OF HAZARD COMMUNICATION PROGRAMS INCLUDING LABELS, MATERIAL SAFETY DATA SHEETS, TRAINING, AND ACCESS TO WRITTEN RECORDS

48FR53280 11/25/83

FOLLOWING OSHA STANDARDS APPLICABLE TO SUBSTANCES LISTED 29CFR1910, OTHERWISE ADVISE:

OSHA STANDARD 29CFR1910.1000 AIR CONTAMINANTS
TABLE Z-2

OSHA STANDARD 29CFR1910.94 VENTILATION

OSHA STANDARD 29CFR1910.134 RESPIRATORY PROTECTION

OSHA STANDARD 29CFR1910.20 ACCESS TO EMPLOYEE EXPOSURE AND MEDICAL RECORDS

OSHA STANDARD 29CFR1910.132 PERSONAL PROTECTIVE EQUIPMENT

OSHA STANDARD 29CFR1910.141 SANITATION

OSHA STANDARD 29CFR1910.151 MEDICAL SERVICES AND FIRST AID

OSHA STANDARD 29CFR1910.133 EYE AND FACE PROTECTION

40CFR717 RECORDS AND REPORTS OF ALLEGATIONS THAT CHEMICAL SUBSTANCES CAUSE SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT

REQUIRES MANUFACTURERS AND CERTAIN PROCESSORS OF CHEMICAL SUBSTANCES AND MIXTURES TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT ALLEGED TO HAVE BEEN CAUSED BY A SUBSTANCE OR MIXTURE. EPA MAY INSPECT AND REQUIRE REPORTING OF SUCH RECORDS.

48FR38178 08/22/83

OSHA STANDARD 29CFR1910.106 FLAMMABLE AND COMBUSTIBLE LIQUIDS

APPLIES TO THE HANDLING, STORAGE, AND USE OF FLAMMABLE AND COMBUSTIBLE LIQUIDS WITH A FLASH POINT BELOW 200 F

SUBSTANCE LISTED TOXIC SUBSTANCES CONTROL ACT INVENTORY

49CFR172.101 TABLES OF HAZARDOUS MATERIALS, THEIR DESCRIPTION, PROPER SHIPPING NAME, CLASS, LABEL, PACKAGING, AND OTHER REQUIREMENTS

DESIGNATED IN HAZARDOUS MATERIALS TABLE AS HAZARDOUS MATERIAL FOR THE PURPOSE OF TRANSPORTATION.

41FR15996 04/15/76
45FR34588 05/22/80 (AMENDMENT)
45FR46420 07/10/80 (AMENDMENT)
45FR62080 09/18/80 (AMENDMENT)
45FR74649 11/10/80 (AMENDMENT)
46FR17739 03/19/81 (AMENDMENT)
46FR19235 03/30/81 (AMENDMENT)

49CFR172.102 TABLES OF HAZARDOUS MATERIALS, THEIR DESCRIPTION, PROPER SHIPPING NAME, CLASS, LABEL, PACKAGING, AND OTHER REQUIREMENTS

DESIGNATED IN OPTIONAL HAZARDOUS MATERIALS TABLE WITH ALTERNATIVES TO CORRESPONDING REQUIREMENTS IN 49CFR172.101 FOR INTERNATIONAL SHIPMENTS AS AUTHORIZED BY 49CFR171.12

41FR15996 04/15/76
46FR29393 06/01/81 (AMENDMENT)
46FR32250 06/22/81 (AMENDMENT)

16CFR1500.14 PRODUCTS REQUIRING SPECIAL LABELING UNDER SECTION 3(B) OF THE FEDERAL HAZARDOUS SUBSTANCES ACT

38FR27012 09/27/73
41FR22934 06/08/76
48FR16 01/03/83

SUBSTANCE LISTED AS TOXIC POLLUTANT UNDER CLEAN WATER ACT (CWA) SECTION 307(A)

40CFR116 DESIGNATION OF HAZARDOUS SUBSTANCES

DESIGNATED AS HAZARDOUS SUBSTANCE IN ACCORDANCE WITH SECTION 311(B)(2)(A) OF THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED. INCLUDES ANY ISOMERS AND HYDRATES, AS WELL AS ANY SOLUTIONS AND MIXTURES CONTAINING THIS SUBSTANCE.

43FR10747 03/13/78
43FR27533 06/26/78
44FR10266 02/16/79 (AMENDMENT)
44FR10268 02/16/79 (AMENDMENT)
44FR65400 11/13/79 (AMENDMENT)
44FR66602 11/20/79 (AMENDMENT)

40CFR122, APPENDIX D - NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
PERMIT APPLICATION TESTING REQUIREMENTS

TABLE II - ORGANIC TOXIC POLLUTANTS IN EACH OF FOUR FRACTIONS IN
ANALYSIS BY GAS CHROMATOGRAPHY/MASS SPECTROSCOPY (GS/MS)

48FR14153 04/01/83

TECHNICAL ASSISTANCE DATA COMPLETED/PUBLISHED CLEAN WATER ACT
(CWA) SECTION 311

WATER QUALITY CRITERIA COMPLETED/PUBLISHED CLEAN WATER ACT
(CWA) SECTION 304(A) 45CFR231

WATER QUALITY CRITERIA DOCUMENT COMPLETED/PUBLISHED CLEAN WATER
ACT (CWA) SECTION 304(A)

40CFR261.33(F) DISCARDED COMMERCIAL CHEMICAL PRODUCTS, OFF-
SPECIFICATION SPECIES, CONTAINERS, AND SPILL RESIDUES THEREOF
COMMERCIAL CHEMICAL PRODUCT OR MANUFACTURING CHEMICAL INTER-
MEDIATE IDENTIFIED AS TOXIC WASTE UNLESS OTHERWISE DESIGNATED.
45FR33084 05/19/80

SUBSTANCE LISTED RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)
40CFR261.31 EPA HAZARDOUS WASTE NO. F005: SPENT NON-
HALOGENATED SOLVENT AND STILL BOTTOMS FROM THE RECOVERY
OF THIS SOLVENT. (I,T)
SENATE BILL S.575 WOULD DIRECT EPA TO REVIEW, BY 7/1/85,
DISPOSAL OF WASTES CONTAINING THIS SUBSTANCE TO DETERMINE
WHETHER IT SHOULD BE BANNED FROM LAND DISPOSAL

SUBSTANCE LISTED RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)
40CFR261.32 EPA HAZARDOUS WASTE NO. K036: STILL BOTTOMS FROM
TOLUENE RECLAMATION DISTILLATION IN THE PRODUCTION OF DISUL-
FOTON. (T)

SUBSTANCE LISTED RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)
40CFR261.31 EPA HAZARDOUS WASTE NO. F024: WASTES, INCLUDING BUT NOT
LIMITED TO, DISTILLATION RESIDUES, HEAVY ENDS, TARS, AND REACTOR
CLEANOUT WASTES FROM THE PRODUCTION OF CHLORINATED ALIPHATIC HYDRO-
CARBONS, HAVING CARBON CONTENT FROM ONE TO FIVE, UTILIZING FREE RADICAL
CATALYZED PROCESSES. (THIS LIST DOES NOT INCLUDE LIGHT ENDS, SPENT
FILTERS AND FILTER AIDS, SPENT DESSICANTS, WASTEWATER, WASTEWATER TREAT-
MENT SLUDGES, SPENT CATALYSTS, AND WASTES LISTED IN 40CFR261.32)
49FR5308 02/10/84

SOURCE/EXPOSURE ASSESSMENT COMPLETED/PUBLISHED CLEAN AIR
ACT (CAA)

RISK DOCUMENTATION/ASSESSMENT COMPLETED/PUBLISHED CLEAN
WATER ACT (CWA)

SUMMARY REVIEW COMPLETED/PUBLISHED TOXIC SUBSTANCES CONTROL
ACT (TSCA)

TOXIC SUBSTANCE CONTROL ACT (TSCA) SECTION 8(E) INITIAL
EVALUATION OF SUBSTANTIAL RISK SUBMITTED TO EPA, 1982

CHEMICAL HAZARD INFORMATION PROFILE (CHIP) PUBLISHED
BY EPA OFFICE OF PESTICIDES AND TOXIC SUBSTANCES

EPA HAS DECIDED NOT TO DEVELOP A TEST RULE UNDER TOXIC SUBSTANCES
CONTROL ACT SECTION 4(A) FOR TOLUENE AT THIS TIME BECAUSE THE RESULTS
FROM COMPLETED TESTING AND PLANNED TESTING PROGRAMS WILL SUPPLY SUFFICIENT
INFORMATION TO CHARACTERIZE OR REASONABLY PREDICT THE HEALTH
EFFECTS RECOMMENDED FOR CONSIDERATION BY THE INTERAGENCY TESTING
COMMITTEE

47FR56391 10/16/82

SUBSTANCE LISTED HAZARDOUS
STATE OF CALIFORNIA ADMINISTRATIVE CODE
TITLE 22. SOCIAL SECURITY
DIVISION 4. ENVIRONMENTAL HEALTH
CHAPTER 30. MINIMUM STANDARDS FOR MANAGEMENT OF HAZARDOUS AND
EXTREMELY HAZARDOUS WASTES

SUNSTANCE SUBJECT TO REQUIREMENTS OF GENERAL INDUSTRY SAFETY ORDER
(GISO) 5194 OR TITLE 8 OF CALIFORNIA ADMINSTRATIVE CODE AND DIVISION 5,
CHAPTER 2.5 OF CALIFORNIA LABOR CODE

SUBSTANCE LISTED WEST VIRGINIA DEPARTMENT OF LABOR LISTING OF
HAZARDOUS SUBSTANCES

THIS SUBSTANCE TESTED FOR CARCINOGENESIS BY THE NATIONAL
INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES (NIEHS)

THIS SUBSTANCE TESTED FOR MUTAGENESIS/GENETIC TOXICITY
BY THE NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
(NIEHS)

MEDICAL SURVEILLANCE REQUIRED

EKG RECOMMENDED IF EMPLOYEE TO WEAR FULL-FACE RESPIRATOR
GENERAL MEDICAL HISTORY

40CFR717 RECORDS AND REPORTS OF ALLEGATIONS THAT CHEMICAL SUBSTANCES
CAUSE SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT

TOXIC SUBSTANCES CONTROL ACT (TSCA) SECTION 8(C) RULE REQUIRES
MANUFACTURERS AND CERTAIN PROCESSORS OF CHEMICAL SUBSTANCES AND MIXTURES
TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO EMPLOYEE HEALTH FOR
30 YEARS

48FR38187 08/22/83

38FR38225 03/30/83 (EFFECTIVE DATE CORRECTION)

PHYSICIAN EXAMINATION

INDUSTRIAL EXPOSURE HISTORY

PRE-PLACEMENT AND ANNUAL EXAMS

MEDICAL WARNING FOR REFUSAL OF MEDICAL EXAMINATION

BLOOD CHEMISTRY

COMPLETE BLOOD COUNT

RESPIRATORY HISTORY
VISION TEST
URINALYSIS
PULMONARY FUNCTIONS
PHYSICIAN EXAMINATION
INDUSTRIAL EXPOSURE HISTORY
ELECTROCARDIOGRAM
SKIN EXAM
SPECIAL ATTENTION TO SKIN
WEIGHT

CERTIFICATIONS

HEALTH STATUS CLASSIFICATION

OSHA RESPIRATOR CERTIFICATION 29CFR1910.134

DEPARTMENT OF TRANSPORTATION IF OPERATES HEAVY EQUIPMENT

EMPLOYEE HAZARDOUS MATERIALS EDUCATION RECEIPT

EMPLOYEE MEDICAL RECORDS RECEIPT

TOXIC SUBSTANCES CONTROL ACT (TSCA) SECTION 8(C) RULE
REQUIRES MANUFACTURERS AND CERTAIN PROCESSORS OF CHEMICAL
SUBSTANCES AND MIXTURES TO KEEP RECORDS OF SIGNIFICANT
ADVERSE REACTIONS TO EMPLOYEE HEALTH FOR 30 YEARS.
CONTACT: JACK P. MCCARTHY, OFFICE OF TOXIC SUBSTANCES,
EPA (800)424-1404. 48FR38178 8/22/83

MEDICAL WARNING REQUIRED FOR MEDICAL EXAM REFUSAL SIGNED
BY EMPLOYEE

SPECIAL DIAGNOSTIC TESTS

HIPPURIC ACID URINE > 5G/LITER

URINE PHENOL

COMPLETE NEUROLOGIC EXAM

BLOOD CHEMISTRY

URINALYSIS

COMPLETE BLOOD COUNT

DIFFERENTIAL WHITE BLOOD CELL COUNT

LIVER PROFILE BLOOD TESTS

IF SYMPTOMS OF CENTRAL NERVOUS SYSTEM OCCUR, OBTAIN BLOOD GLUCOSE AND
RECTAL TEMPERATURE. PERFORM COMPLETE NEUROLOGIC EXAMINATION AND ANY
OTHER SPECIFIC NEUROLOGIC TESTS AS APPLICABLE
PULMONARY FUNCTION

LEAKS AND SPILL PROCEDURES

DEPARTMENT OF TRANSPORTATION HAZARD CLASS
49CFR172.101 HAZARDOUS MATERIALS TABLE

FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS
49CFR172.101 (SUBJECT TO ADDITIONAL LABELING REQUIREMENTS OF
49CFR172.402)

FLAMMABLE LIQUID

INTERGOVERNMENTAL MARITIME ORGANIZATION HAZARD CLASS
49CFR172.102 OPTIONAL HAZARDOUS MATERIALS TABLE

CLASS 3.2-INFLAMMABLE LIQUIDS

INTERGOVERNMENTAL MARITIME ORGANIZATION LABELING SPECIFICATIONS FOR
DOMESTIC AND EXPORT SHIPMENTS
49CFR172.102

FLAMMABLE LIQUID

FOLLOWING INFORMATION FROM BUREAU OF EXPLOSIVES "EMERGENCY HANDLING OF
HAZARDOUS MATERIALS":

IF MATERIAL ON FIRE OR INVOLVED IN FIRE:

- * DO NOT EXTINGUISH FIRE UNLESS FLOW CAN BE STOPPED
- * USE WATER IN FLOODING QUANTITIES AS FOG
- * SOLID STREAM OF WATER MAY SPREAD FIRE
- * COOL ALL AFFECTED CONTAINERS WITH FLOODING QUANTITIES OF WATER
- * APPLY WATER FROM AS FAR A DISTANCE AS POSSIBLE
- * USE ALCOHOL FOAM OR CO2 OR DRY CHEMICAL EXTINGUISHERS

IF MATERIAL IS NOT ON FIRE AND IS NOT INVOLVED IN FIRE:

- * KEEP SPARKS, FLAMES AND OTHER IGNITION SOURCES AWAY
- * KEEP MATERIAL OUT OF WATER SOURCES AND SEWERS
- * BUILD DIKES TO CONTAIN FLOW AS NECESSARY
- * ATTEMPT TO STOP LEAK IF WITHOUT HAZARD
- * USE WATER SPRAY TO KNOCK DOWN VAPORS

PERSONNEL PROTECTION:

- * KEEP UPWIND
- * DO NOT HANDLE BROKEN PACKAGES WITHOUT PROTECTIVE EQUIPMENT
- * WEAR BOOTS, PROTECTIVE GLOVES AND GAS TIGHT GOGGLES
- * WASH AWAY ANY MATERIALS WHICH MAY HAVE CONTACTED THE BODY WITH
COPIOUS AMOUNTS OF WATER OR SOAP AND WATER
- * AVOID BREATHING DUST/VAPORS/FUMES FROM MATERIAL

LAND SPILL:

- * DIG A PIT, POND, LAGOON OR HOLDING AREA TO CONTAIN LIQUID OR SOLID MATERIAL
- * DIKE SURFACE FLOW USING SOIL, SANDBAGS, FOAMED POLYURETHANE OR FOAMED CONCRETE
- * ABSORB BULK LIQUID WITH FLY ASH OR CEMENT POWDER
- * APPLY UNIVERSAL GELLING AGENT TO IMMOBILIZE SPILL
- * APPLY FLUOROCARBON WATER FOAM TO DIMINISH VAPOR AND FIRE HAZARD

WATER SPILL:

- * USE NATURAL BARRIERS OR OIL SPILL CONTROL BOOMS TO LIMIT SPILL MOTION
- * USE SURFACE ACTIVE AGENT, DETERGENTS, SOAPS, ALCOHOLS TO COMPRESS AND THICKEN SPILLED MATERIAL
- * INJECT UNIVERSAL GELLING AGENT TO SOLIDIFY ENCIRCLED SPILL AND INCREASE EFFECTIVENESS OF BOOMS
- * REMOVE TRAPPED MATERIAL WITH SUCTION HOSES
- * USE MECHANICAL DREDGES OR LIFTS TO REMOVE IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES

AIR SPILL:

- * APPLY WATER SPRAY TO KNOCK DOWN VAPORS

FOLLOWING INFORMATION FROM DEPARTMENT OF TRANSPORTATION/U.S. COAST GUARD "CHEMICAL RESPONSE INFORMATION SYSTEM", REGARDING WATER SPILLS:

- * SUBSTANCE FLOATS ON WATER
- * RESTRICT ACCESS OF GENERAL PUBLIC WHEN APPRECIABLE DANGER ARISES FROM SPILL
- * RESTRICT IGNITION SOURCES WHEN SUBSTANCE INVOLVED
- * RESTRICT HUMAN USE WHEN SUBSTANCE INVOLVED
- * CONTAIN SURFACE SLICKS
- * SKIM SURFACE SLICK
- * HIGHLY VOLATILE, AVOID INHALATION, VAPORS OR DUST ARE IRRITATING OR TOXIC
- * HIGHLY CORROSIVE, AVOID DIRECT CONTACT, CONTACT WITH SKIN OR EYES CAN CAUSE IRRITATION OR BURNS
- * BURNING MAY BE PROHIBITED BY ANTI-POLLUTION LAWS AND REGULATIONS
- * SUBSTANCE HAS SOOTY BURNING

WASTE

THIS MATERIAL LISTED AS HAZARDOUS SUBSTANCE, AS DEFINED IN SECTION 101(14) OF THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA) OF 1980, PURSUANT TO ONE OR MORE OF THE FOLLOWING:

- FEDERAL WATER POLLUTION CONTROL ACT (FWPCA) SECTION 311 (B) (2) (A)
- SOLID WASTE DISPOSAL ACT SECTION 3001 40CFR261
- CLEAN WATER ACT (CWA) SECTION 307(A) 40CFR129

- CLEAN AIR ACT (CAA) SECTION 112 40CFR61
- TOXIC SUBSTANCES CONTROL ACT (TSCA) SECTION 7
- COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA) SECTION 102

EPA HAZARDOUS WASTE NUMBER U220

TOLUENE

40CFR260 HAZARDOUS WASTE MANAGEMENT SYSTEM: GENERAL

PROVIDES DEFINITIONS OF TERMS, GENERAL STANDARDS, AND OVERVIEW INFORMATION APPLICABLE TO 40CFR PARTS 260-265

45FR76075 11/17/80
 45FR76630 11/19/80
 45FR86968 12/31/80
 46FR2348 01/09/81
 46FR27476 05/20/81
 46FR35247 07/07/81
 47FR32349 07/26/82
 47FR41563 09/21/82
 48FR2511 01/16/83
 48FR14293 04/01/83

40CFR261 IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

IDENTIFIES THOSE SOLID WASTES WHICH ARE SUBJECT TO REGULATION AS HAZARDOUS WASTES UNDER 40CFR PARTS 262-265, 270, 271, AND 124 AND WHICH ARE SUBJECT TO THE NOTIFICATION REQUIREMENTS OF SECTION 3010 OF THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) AND IDENTIFIES ONLY SOME OF THE MATERIALS WHICH ARE HAZARDOUS WASTES UNDER SECTIONS 3007 AND 7003 OF RCRA

| | |
|--------------------|--------------------|
| 45FR33119 05/19/80 | 46FR27477 05/20/81 |
| 45FR72037 10/30/80 | 46FR29708 06/03/81 |
| 45FR74892 11/12/80 | 46FR34587 07/02/81 |
| 45FR76620 11/19/80 | 46FR35247 07/07/81 |
| 45FR76623 11/19/80 | 46FR47429 09/25/81 |
| 45FR78529 11/25/80 | 46FR56588 11/11/81 |
| 45FR78531 11/25/80 | 47FR36097 08/18/82 |
| 45FR80287 12/04/80 | 48FR14293 04/01/83 |
| 46FR4613 01/16/81 | 48FR14294 04/01/83 |
| 46FR4619 01/16/81 | 48FR15257 04/08/83 |
| 46FR27476 05/20/81 | 48FR30115 06/30/83 |

40CFR262 STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE

ESTABLISHES STANDARDS FOR GENERATORS OF HAZARDOUS WASTE

45FR33142 05/19/80
 45FR78529 11/25/80
 45FR86970 12/31/80
 45FR86973 12/31/80
 47FR1251 01/11/82
 48FR3981 01/28/83
 48FR14294 04/01/83
 48FR13028 04/29/83

40CFR263 STANDARDS APPLICABLE TO TRANSPORTERS OF HAZARDOUS WASTE

ESTABLISHES STANDARDS WHICH APPLY TO PERSONS TRANSPORTING HAZARDOUS WASTE WITHIN THE UNITED STATES IF THE TRANSPORTATION REQUIRES A MANIFEST UNDER 40CFR262

45FR33151 05/19/80
45FR86968 12/31/80
48FR14294 12/31/80

40CFR264 STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

ESTABLISHES MINIMUM NATIONAL STANDARDS WHICH DEFINE THE ACCEPTABLE MANAGEMENT OF HAZARDOUS WASTE

| | | | |
|-----------|----------|-----------|----------|
| 45FR33221 | 05/19/80 | 47FR17989 | 04/27/82 |
| 45FR76075 | 11/17/80 | 47FR19995 | 05/10/82 |
| 45FR86968 | 12/31/80 | 47FR27532 | 06/24/82 |
| 45FR86970 | 12/31/80 | 47FR27533 | 06/24/82 |
| 45FR86974 | 12/31/80 | 47FR28627 | 07/01/82 |
| 46FR2848 | 01/12/81 | 47FR32349 | 07/26/82 |
| 46FR2849 | 01/12/81 | 47FR32350 | 07/26/82 |
| 46FR2866 | 01/12/81 | 47FR32356 | 07/26/82 |
| 46FR2867 | 01/12/81 | 47FR32357 | 07/26/82 |
| 46FR7678 | 01/23/81 | 47FR32359 | 07/26/82 |
| 46FR27480 | 05/20/81 | 47FR32361 | 07/26/82 |
| 46FR35249 | 07/07/81 | 47FR32365 | 07/26/82 |
| 46FR55112 | 11/06/81 | 47FR32384 | 07/26/82 |
| 46FR57285 | 11/23/81 | 47FR30447 | 07/13/82 |
| 47FR953 | 01/08/82 | 48FR2511 | 01/19/83 |
| 47FR8306 | 02/25/82 | 48FR3982 | 01/28/83 |
| 47FR15047 | 04/07/82 | 48FR14294 | 04/01/83 |
| 47FR15059 | 04/07/82 | 48FR14295 | 04/01/83 |
| 47FR16554 | 04/16/82 | 48FR30115 | 06/30/83 |
| 47FR16556 | 04/16/82 | | |

40CFR265 INTERIM STATUS STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

ESTABLISHES MINIMUM NATIONAL STANDARDS WHICH DEFINE THE ACCEPTABLE MANAGEMENT OF HAZARDOUS WASTE DURING THE PERIOD OF INTERIM STATUS

| | | | |
|-----------|----------|-----------|----------|
| 45FR33232 | 05/19/80 | 47FR12318 | 03/22/82 |
| 45FR76075 | 11/17/80 | 47FR15064 | 04/07/82 |
| 45FR78529 | 11/25/80 | 47FR16558 | 04/16/82 |
| 45FR86968 | 12/31/80 | 47FR27533 | 06/24/82 |

45FR86970 12/31/80 47FR28627 07/01/82
45FR86974 12/31/80 47FR30447 07/13/82
46FR2875 01/12/81 47FR32367 07/26/82
46FR7680 01/23/81 47FR32368 07/26/82
46FR27480 05/20/81 47FR32369 07/26/82
46FR35249 07/07/81 48FR2511 01/19/83
46FR56596 11/17/81 48FR3982 01/28/83
47FR1255 01/11/82 48FR14295 04/01/83
47FR8306 02/25/82 48FR30115 06/30/83

40CFR267 INTERIM STANDARDS FOR OWNERS AND OPERATORS OF NEW
HAZARDOUS WASTE LAND DISPOSAL FACILITIES

ESTABLISHES MINIMUM NATIONAL STANDARDS THAT DEFINE THE
ACCEPTABLE MANAGEMENT OF HAZARDOUS WASTE FOR NEW LAND
DISPOSAL FACILITIES

46FR12429 02/13/81

40CFR270 EPA ADMINISTERED PERMIT PROGRAMS: THE HAZARDOUS WASTE
PERMIT PROGRAM

ESTABLISHES PROVISIONS FOR THE HAZARDOUS WASTE PERMIT PROGRAM
UNDER SUBTITLE C OF THE SOLID WASTE DISPOSAL ACT, AS AMENDED BY
THE RESOURCE CONSERVATION AND RECOVERY ACT

48FR14223 04/01/83

48FR30113 06/30/83

48FR30114 06/30/83

40CFR271 REQUIREMENT FOR AUTHORIZATION OF STATE HAZARDOUS WASTE
PROGRAMS

SPECIFIES THE PROCEDURES EPA WILL FOLLOW IN APPROVING, RE-
VISING, AND WITHDRAWING APPROVAL OF STATE PROGRAMS AND THE
REQUIREMENTS STATE PROGRAMS MUST MEET TO BE APPROVED BY THE
ADMINISTRATOR UNDER SECTION 3006(B) OF RCRA

48FR14243 04/01/83

48FR30114 06/30/83

48FR30115 06/30/83

CAS NUMBER

108-33-3

REGISTRY TOXIC CHEMICALS NUMBER

XS5250000

BULLETINS

SPECIAL INFORMATION

APPENDIX H

EQUIPMENT DECONTAMINATION PROCEDURES

The following procedures will be used to decontaminate soil and groundwater sampling equipment to prevent cross contamination of samples. The following procedures meet applicable EPA protocols for sampling equipment decontamination.

I. FIELD SETUP

To prevent cross contamination from decontamination washing and rinsing overspray during the procedure, the following field setup protocol will be followed.

- One 5-foot folding table, covered in sheet plastic draping down onto the ground to provide a walking area will be used for washing and rinsing activities.
- One 5-foot folding table, covered in sheet plastic draping down onto the ground to provide a walking area will be used for air drying and temporary storage activities.
- A plastic tub can be used for non-phosphate detergent washes.
- Stiff long-handled nonmetallic bristle scrub brushes will be used.
- Stainless steel pans with perforated trays will be used for tap water draining, methanol and hexane rinsing, and American Society for Testing and Materials (ASTM) Type II water rinsing (one each - three total), and will be used exclusively for each activity.
- Small laboratory rinse bottles will be used for pesticide grade solvent rinsing.
- Stainless steel sprayers (up to 5 gallon capacity) will be used for tap water and ASTM Type II water rinsing, and will be used exclusively for each activity.
- Potable water (tap water) must come from a single source and must be subjected to periodic QC analysis; the single source location for the potable water will be from the location directed by the site manager or designee.

II. SAMPLING EQUIPMENT - METAL

All metal sampling equipment, including stainless steel bailers, split-spoon samplers, sample sleeves, hand augers and sample cutting knives used to collect samples for organics

or metals analysis will be decontaminated according to the following procedure before each sample is taken.

1. Knock off or prescrub with tap water in a plastic tub.
2. Discard prescrub tap water and replace with clean tap water when it becomes visibly dirty and discolored.
3. Scrub clean with a stiff, long-handled, nonmetallic scrub brush and a non-phosphate detergent and tap water solution (Liquinox or equivalent) in a plastic tub.
4. Replace the non-phosphate detergent and tap water solution when it becomes visibly dirty and discolored.
5. Rinse with tap water.
6. Rinse with ASTM Type II water.
7. Rinse with methanol (methyl alcohol, pesticide grade or equivalent).
8. Rinse with pesticide grade hexane.

Place clean sampling equipment in a clean area on the drying table and allow it to air dry. If the decontaminated sampling equipment will not be used immediately, place it in suitably sized plastic bags. Seal with a signed, dated custody seal. Label the plastic bags "clean" and store in a contaminant-free environment.

III. SAMPLING EQUIPMENT - TEFLON AND OTHER PLASTICS

Teflon bailers or any other plastic equipment used to collect samples for organics or metals analysis will be decontaminated as follows.

1. Scrub with a non-phosphate detergent and tap water solution (Liquinox or equivalent) in a plastic tub.
2. Replace the non-phosphate detergent and tap water solution when it becomes dirty and discolored.
3. Rinse with tap water.
4. Rinse with ASTM Type II water.
5. Rinse with methanol (methyl alcohol, pesticide grade or equivalent).

6. Rinse with pesticide grade hexane.

Place clean sampling equipment in a clean area on the drying table and allow it to air dry. If the decontaminated sampling equipment will not be used immediately, place it in suitably sized plastic bags. Seal with a signed, dated custody seal. Label the plastic bags "clean" and store in a contaminant-free environment.

IV. DOCUMENTATION

The following information (at a minimum) must be logged into a field notebook to demonstrate that the decontamination procedure was performed properly.

1. Date
2. Site Location
3. Decontamination procedures and solutions used
4. Type of equipment decontaminated (manufacturer's name, model, and serial number as applicable)
5. Special or unusual conditions or problems (e.g., wind, ambient air conditions, etc.)
6. Storage location for clean equipment not immediately used.

V. SAFETY CONSIDERATIONS

1. Proper precautions must be taken when using solvents. Refer to the applicable site safety and health procedure before using. Make sure the correct personal protective equipment is available, and is used when handling solvents.
2. Decontaminate equipment and clean up the site in accordance with approved project procedures.
3. Dispose of the waste waters, solvents, and PPE in accordance with approved project waste management procedures when sampling and decontamination are complete.

4001 308

EMPLOYEE PHYSIOLOGICAL MONITORING RECORD FOR HEAT STRESS

Employee Name: _____

Employee SSN: _____

Division: _____

Location: _____

Date: _____

Job Number: _____

Start Time: _____

Stop Time: _____

Health & Safety Officer: _____

Supervisor: _____

TEMPERATURES

A. INITIAL READING

1. Ambient Air Temperature _____
2. Baseline Oral Temperature _____
3. WBGT _____

B. AFTER FIRST WORK PERIOD

1. Ambient Air Temperature _____
2. Oral Temperature _____
3. WBGT _____

C. AFTER SECOND WORK PERIOD

1. Ambient Air Temperature _____
2. Oral Temperature _____
3. WBGT _____

D. AFTER THIRD WORK PERIOD

1. Ambient Air Temperature _____
2. Oral Temperature _____
3. WBGT _____

E. AFTER FOURTH WORK PERIOD

1. Ambient Air Temperature _____
2. Oral Temperature _____
3. WBGT _____

F. AFTER FIFTH WORK PERIOD

1. Ambient Air Temperature _____
2. Oral Temperature _____
3. WBGT _____

HEART RATE

A. INITIAL READING

1. Baseline Heart Rate _____ B/min

B. AFTER FIRST WORK PERIOD

1. Heart Rate _____ B/min

C. AFTER SECOND WORK PERIOD

1. Heart Rate _____ B/min

D. AFTER THIRD WORK PERIOD

1. Heart Rate _____ B/min

E. AFTER FOURTH WORK PERIOD

1. Heart Rate _____ B/min

F. AFTER FIFTH WORK PERIOD

1. Heart Rate _____ B/min

This completed form should be retained in project file.

B/min = Beats per minute

HEALTH & SAFETY EXPOSURE MONITORING

PROJECT #: _____
PROJECT LOCATION: _____
PROJECT ACTIVITY: _____

DATE _____
LOCATION MONITORED _____
ACTIVITY MONITORED _____

DRILL RIG TYPE/NO. _____

PERSONNEL AT THIS LOCATION: _____

PERSONNEL AFFECTED BY H&S MONITORING: _____

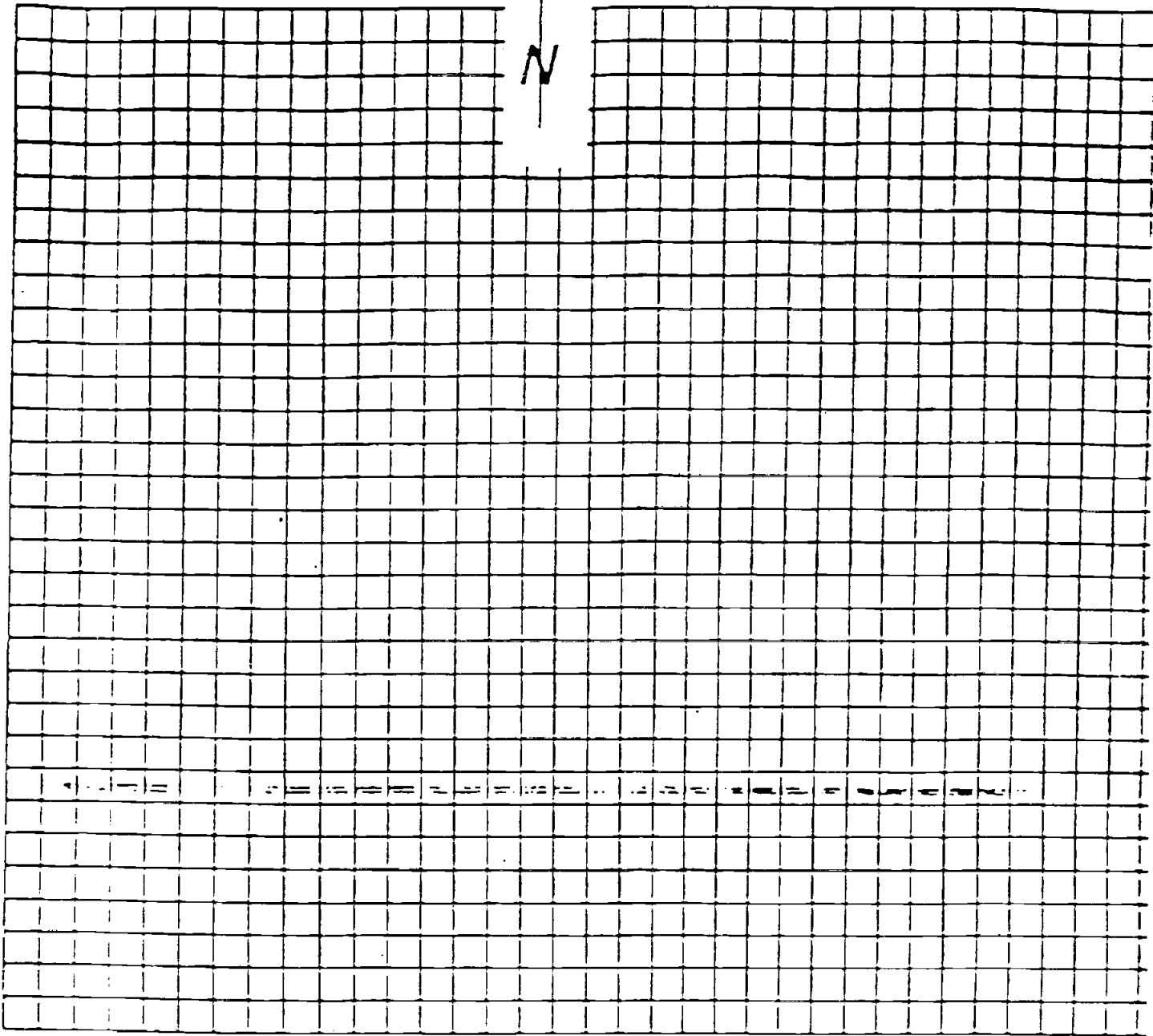
[illegible]

| INSTRUMENT | MFG/ MODEL # | SERIAL # | CALIBRATION STANDARD | | INITIAL | END OF DAY |
|------------|--------------|----------|----------------------|-----------|-------------------|-------------------|
| | | | CAL GAS | STD (ppm) | CALIBRATION CHECK | CALIBRATION CHECK |
| FD | _____ | _____ | _____ | _____ | _____ | _____ |
| PD | _____ | _____ | _____ | _____ | _____ | _____ |
| NO2 | _____ | _____ | _____ | _____ | _____ | _____ |
| LEL | _____ | _____ | _____ | _____ | _____ | _____ |
| H2S | _____ | _____ | _____ | _____ | _____ | _____ |
| RAM | _____ | _____ | _____ | _____ | _____ | _____ |

FIELD TEAM LEADER SIGNATURE _____

000000

0000



WEATHER:

WIND SPEED:

TEMPERATURE:

WIND DIRECTION:

AIR MONITORING RECORD

Employee Name _____
 Social Security No. _____
 Employee No. _____
 Job Title _____

Company Name _____
 Date Sampled _____
 Shift _____
 Sampled By _____

Calibration Data _____
 Instrument Serial No. _____
 Model No. _____

Date of Calibration _____
 Flow Rate _____
 Calibrated By _____
 Method _____

| Sample Type/Analyte | Collection Media | Description of Collector - Mfg., Lot #, Type of Filter, etc. |
|--|--|--|
| <input type="checkbox"/> Personal - TWA | <input type="checkbox"/> Charcoal Tube | |
| <input type="checkbox"/> Personal - Peak | <input type="checkbox"/> Filter (Resp.) | |
| <input type="checkbox"/> Area | <input type="checkbox"/> Filter (Total) | |
| <input type="checkbox"/> Blank | <input type="checkbox"/> Impinger | |
| <input type="checkbox"/> Bulk | <input type="checkbox"/> Passive Dosimeter | |
| <input type="checkbox"/> Lab Control | <input type="checkbox"/> Silica Gel | |
| <input type="checkbox"/> Source | <input type="checkbox"/> Chromosorb | |
| | | Length of Time on this Job _____ |
| | | Does Sample Represent Typical Exposure? _____ |

Describe any personal protection used or the type of operation (if area monitoring only)

Sampling Date _____ Temp _____ Barometer _____ Humidity _____ Wind _____

| EQUIP. IDENT NO. | SAMPLE NO. | TIME ON | TIME OFF | TOTAL TIME | FLOW SAMPLE VOLUME | ANALYTICAL RESULT | TWA |
|------------------|------------|---------|----------|------------|--------------------|-------------------|-----|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

DESCRIPTIVE DATA: Work task, unusual events, engineering controls, sample interferences, etc.

Date: _____ Signature: _____

APPENDIX J

Accident Investigation and Notification

ACCIDENT INVESTIGATION AND NOTIFICATION

1.0 OBJECTIVE

1.1 This Standard Operating Procedure provides the following:

- 1.1.1 Effective investigation and analysis of accidents/post-accident procedures
- 1.1.2 Reporting and recording procedures for accidents, injuries, and hazardous chemical releases and exposures
- 1.1.3 Applicable site postings
- 1.1.4 Accident response procedures

2.0 APPLICABILITY

2.1 This procedure applies to all employees covered by the Jacobs Environmental Health and Safety Program. The information herein will be included in the Emergency Preparedness Section of site health and safety plans.

3.0 SCOPE

3.1 The scope of this SOP is intended to cover accident investigation and notification of all accidents and/or incidents including "near misses." This SOP further covers procedure, reporting, and record keeping requirements for personal injury, illness, and exposure. Also covered are any accidental releases of hazardous chemicals and/or property damage occurring as a consequence of site activity.

4.0 PROGRAM ADMINISTRATION DEFINITIONS

- 4.1 The *Corporate Health and Safety Manager* (CHSM) is responsible for reviewing all occupationally-related injuries, illnesses, and exposures, including First Aid only and OSHA reportable incidents, and hazardous chemical releases. The CHSM is also responsible for taking necessary corrective action based on submitted reports and notifications.
- 4.2 The *Corporate Health and Safety Administrator* (CHSA) is responsible for maintenance for all corporate health and safety files and collecting all occupationally-related injury, illness, exposure, and hazardous chemical release information.
- 4.3 The *Site Manager* (SM) is responsible for conducting investigations of accidents/incidents and "near misses." After identification of problems, corrective actions will be instituted. All findings and corrective actions will be documented on the Site Manager's Investigation Report.

- 4.3.1 The SM is also responsible for coordinating with the Corporate Health & Safety Office, local Jacobs Human Resources Department, and Regional Safety Department to insure completion, filing, and posting of all OSHA forms 200 and 101 for reportable site injuries, illnesses, and exposures.
 - 4.3.2 The SM shall notify the CHSM and Regional or Regional Safety Department Representative of all occupationally-related injuries, illnesses, and exposures, including First Aid only and OSHA reportable incidents, and hazardous chemical releases.
 - 4.4 The *Site Health and Safety Officer* (SHSO) is responsible for assisting the SM in the above listed responsibilities.
 - 4.4.1 If a SHSO is not appointed, a designated personnel may be delegated to assist the Site Manager in the reporting and record keeping responsibilities.
 - 4.5 The *Local Human Resources Representative* (LHRR) is responsible for: processing workmans' compensation claims and coordinating approved company doctor, hospital, or clinic for office injuries/exposures. The LHRR is also responsible for following Jacobs Safety Department *and* Corporate Health and Safety Department procedures for office injuries and exposures. In addition, the LHRR shall complete, file, and post OSHA Forms 200 and 101 for reportable office injuries and exposures. This includes injuries while traveling for business.
 - 4.6 The *Regional Safety Department Representative* (RSDR) is responsible for administering the Jacobs Safety Program. Therefore, reporting procedures include notifying the primary contacts designated in attachment A.
- 5.0 PROCEDURE - GENERAL
- 5.1 The following information will be obtained as appropriate:
 - 5.1.1 Approved Company Doctor, Clinic, or Hospital
Prior to initiation of any onsite activities requiring health and safety plans, the SHSO will contact the Coordinator in the Corporate Risk Management Department in Pasadena at (818) 578-6886 to obtain a list of approved medical facilities for the site location.
- 6.0 PROCEDURE - ACCIDENT RESPONSE
- 6.1 Injured/ill employees shall be taken to approved facilities. To obtain a list of approved doctors, clinics, or hospital, see 5.1.1.
 - 6.1.1 An Authorization for Medical Treatment Form (attachment B) is to accompany each injured/ill employee. The top portion of the form is to be completed by job site personnel and the attending physician is

to complete the bottom portion. The completed form must be forwarded to the appropriate regional contact (See attachment A) within 48 hours of each visit. A Workers' Compensation Form (completed by LHRR) may also be required.

7.0 PROCEDURE - POST-ACCIDENT

- 7.1 After the employee has received treatment, the Site Health and Safety Officer will arrange for a post-accident drug screen for all injured employees immediately following an accident. Hepatitis B vaccine may need to be offered to employees who were exposed to blood during responding to an incident. Review SOP 7.6 Bloodborne Pathogens.
- 7.2 Initial accident investigation shall begin at the discretion of the Site Health and Safety Officer and/or the Site Manager. At a minimum, the scene shall be secured (no movement of material or equipment shall be made until a review of the accident is completed) and signed statements from witnesses shall be obtained.

8.0 REPORTING

All occupationally-related injuries, illnesses, accidents, exposures, hazardous chemical releases, and property damage will be appropriately reported. Completion of this activity is imperative to detecting trends and establishing actions to prevent recurrence.

- 8.1 A verbal report must be made to the CHSM *and* RSDR as soon as possible for all occupationally-related injuries (including First Aid only incidents,) illnesses, exposures, and hazardous chemical releases.
- 8.2 Serious or fatal injuries are to be reported *immediately* to the CHSM, the RSDR, the appropriate Operations Manager, and the appropriate Group Vice President.
- 8.3 The following must be reported to the CHSM, RSDR, and the appropriate Operations Manager with the appropriate form(s) (See Section 9.0 Record Keeping): All job related injuries and illnesses requiring a doctors visit, all exposures, and hazardous material releases in potentially reportable quantities (by EPA-RCRA definitions.)
- 8.4 The following information must be made available:
 - 8.4.1 Name, social security number, office location, job title
 - 8.4.2 Date and location of accident or incident
 - 8.4.3 Description of the event/and injury - (extent)
 - 8.4.4 Potential for lost time

8.4.5 What medical facility was used and when

8.4.6 Who rendered First Aid/CPR

8.5 The Corporate Risk Management Department in Pasadena will be contacted to report all property damage. (See attachment A)

8.6 The Project Manager will contact the client

9.0 RECORD KEEPING

All occupationally-related injuries, illnesses, accidents, and hazardous chemical release (exposure) incidents will be appropriately recorded. The following reports will be made and submitted:

9.1 Site Managers Investigation Report (See attachment F)

To be completed by the first line Site Manager as soon as possible following the incident. Return completed form to the RSDR. A copy *must* also be sent to the CHSM.

9.2 Witness Statement (See attachment G)

To be used to obtain a signed statement from witnesses of their complete (factual) observations. Names and permanent addresses shall be secured for future reference. Return to the RSDR. A copy *must* also be sent to the CHSM.

9.3 Employee's Report of Occupational Injury or Disease (See attachment H)

This form is state specific. This form must be completed for all injuries, illnesses, and exposures requiring a doctor's visit. The location code (project number) will be used as the form of identification. Return this form to the RSDR within 24 hours of initial doctor's visit. A copy *must* also be sent to the CHSM.

9.4 Employee Exposure/Hazardous Chemical Release Report Form 9-1 (See attachment C)

9.4.1 All incidents involving exposure to potentially hazardous materials while working, including incidents onsite, in the office, during company travel, and hazardous material releases in potentially reportable quantities (by EPA-RCRA definitions) must be reported to CHSM. Document the incident on Employee Exposure/Hazardous Chemical Release Report, Form 9-1.

9.4.1.1 Further notification procedures, i.e., agency notifications, shall be followed as outlined in the site-specific health and safety plan.

9.4.2 The SM shall complete and return Form 9-1 to the CHSM as soon as possible. A copy of this form *must* also be sent to the RSDR. This form is to be completed for all hazardous chemical exposure and release incidents *only*.

9.4.3 It is important to report all exposures even though the incident is not considered serious or no adverse health effects or symptoms are apparent at the time.

9.4.4 The employee must be given a copy of the report. Additional copies must be placed in the employee's corporate health and safety medical file and exposure file.

9.5 First Aid Register (See attachment E)
This is the primary project injury log. All injuries/illness, treated or reported (actual or alleged), shall be entered into the log. This register is to be used no matter how minor the event may be. *There are no exceptions to this reporting requirement.* The register is kept at the project site.

9.6 Vehicle Accident Reporting Procedure (See attachment I)
For any vehicle accident or injuries involving a vehicle, please follow and complete necessary forms dictated by the Vehicle Accident Reporting Procedures.

10.0 OSHA REPORTING/RECORD KEEPING PROCEDURES

10.1 Preparation and Maintenance of records relating to occupational injuries, illnesses, and exposures required by OSHA will be maintained by:

Office-related This includes injuries or accidents while on company-related travel. LHRR

Project Site-related SHSO or designated personnel

10.2 Log and Summary of Occupational Injuries and Illnesses Form - OSHA Form 200 (See attachment D)

10.2.1 All occupational injuries and illnesses that require treatment other than First Aid are reported on OSHA Form 200 - Log and Summary of Occupational Injuries and Illnesses. Information for each "recordable case" of occupational injury or illness shall be entered on the form within six (6) work days after learning of its occurrence.

10.2.1.1 A "recordable case" is defined on the front of OSHA Form 200 as "...every occupational death, every nonfatal occupational illness, and

those nonfatal occupational injuries which involve one or more of the following: loss of consciousness, restriction of work or motion, transfer to another job, or medical treatment (other than first aid)..." Further definitions and instructions are provided on the back of the form.

- 10.2.1.2 OSHA's record keeping and reporting requirements differ from those under the various State Workers' Compensation laws. Because they differ, employers must not substitute Workers' Compensation criteria for determining whether or not a case should be recorded for OSHA.
- 10.2.2 All entries on OSHA Form 200 must be identified by a case or file number. Entry numbers must be non-duplicating to facilitate comparison with OSHA Form 101, Supplementary Record of Occupational Injuries and Illnesses (described in section 10.3).
- 10.2.3 One OSHA Form 200 is used at the project site or office location per year. Each incident is added to the same form on a separate line.
- 10.2.4 A copy of OSHA Form 200 with injury/illness information recorded shall be sent to the CHSM and RSDR within 45 calendar days of its recording.
- 10.2.5 At the beginning of each calendar year, a summary of all injuries and illnesses recorded on OSHA Form 200 for the preceding year must be made. Instructions on the back of Form 200 describe how the summary is compiled. Even if there were no injuries or illnesses during the year, zeros must be entered on the totals line, and the form posted.
 - 10.2.5.1 The OSHA 200 Form must be posted with summary information for the preceding year where notices to employees are commonly posted *no later than February 1 and must remain in place until March 1.*
 - 10.2.5.2 A copy of the summary OSHA Form 200 *must* be sent to the CHSA and RSDR at year end no later than January 15.

10.3 Supplementary Record of Occupational Injuries and Illness - OSHA Form 101. (See attachment K)

10.3.1 To supplement the Log and Summary of Occupational Injuries and Illnesses - OSHA Form 200, each establishment must maintain a record of each recordable occupational injury or illness. If no suitable report is made for other purposes, the Supplementary Record OSHA No. 101 may be used.

10.3.1 Or, the record may consist of the one or more of the documents listed below.

10.3.1.1 Workers' Compensation, insurance, or other reports are also acceptable as records if they contain all facts listed below or are supplemented to do so.

10.3.1.2 The record may also be listed on a plain sheet of paper containing the following facts. For further information, please see Definitions on the back of OSHA Form 200:

- 1) *About the employer*-name, mail address, and location if different from mail address.
- 2) *About the injured or ill employee*-name, social security number, home address, age, sex, occupation, and department.
- 3) *About the accident or exposure to occupational illness*-place of accident or exposure, whether it was on employer's premises, what the employee was doing when injured, and how the accident occurred.
- 4) *About the occupational injury or illness*-description of the injury or illness, including part of body affected, name of the object or substance which directly injured the employee, and date of injury or diagnosis of illness.
- 5) *Other*-name and address of physician; if hospitalized, name and address of

hospital, date of report, and name and position of person preparing the report.

10.3.2 These records must also be available without delay and at reasonable times for examination by representatives of the Department of Labor and the Department of Health, Education and Welfare, and States accorded jurisdiction under the Act.

10.3.3 The records must be maintained for a period of not less than five years following the end of the calendar year to which they relate.

11.0 SITE POSTINGS

11.1 The following forms will be posted for all on-going field projects. Contact your Regional Safety Department or local OSHA office to obtain these forms and postings.

11.1.1 Jacobs Forms: First Aid Register
Emergency Phone Numbers Specific to the Site

11.1.2 OSHA Forms: OSHA 200 Log
OSHA Health and Safety Poster (or State Equivalent)
Access to Medical and Exposure Records
OSHA Permits
Forklift Operating Instructions

11.1.3 Human resource forms and postings appropriate to each job site will be obtained from regional contacts and kept onsite as required. (See attachment J)

12.0 ATTACHMENTS

The following attachments are included with this SOP:

| | |
|--------------|---|
| Attachment A | Primary Contacts |
| Attachment B | Authorization For Medical Treatment |
| Attachment C | Employee Exposure/Hazardous Chemical Release Report |
| Attachment D | OSHA Form 200 - Log and Summary of Occupational Injuries and Illnesses |
| Attachment E | First Aid Register |
| Attachment F | Site Manager's Investigation Report |
| Attachment G | Witness Statement |
| Attachment H | Employee's Report of Occupational Injury or Disease |
| Attachment I | Vehicle Accident Reporting Procedure |
| Attachment J | Human Resources Contacts |
| Attachment K | OSHA Form 101 - Supplementary Record of Occupational Injuries and Illness |

PRIMARY CONTACTS**Corporate Environmental Health and Safety Department**

Jacobs Engineering Group, Inc.
600 Seventeenth Street, Suite 1100N
Denver, Colorado 80202
Attention: Terry Briggs
Office Phone: (303) 595-8855
FAX Machine: (303) 595-8857

Pasadena Risk Management (Safety) Department

Jacobs Engineering Group, Inc.
251 S. Lake Avenue
Pasadena, California 91101
Attention: Pat Costamagna
Office Phone: (818) 578-6886
FAX Machine: (818) 578-6837

Central Region Safety Department

Jacobs Engineering Group, Inc.
4848 Loop Central Drive
Houston, Texas 77081-2211
Attention: Steve Pianalto
Office Phone: (713) 669-2200
FAX Machine: (713) 669-0045

Eastern Region (Including Louisiana) Safety Department

Jacobs Engineering Group, Inc.
4949 Essen Lane
Baton Rouge, Louisiana 70809
Attention: C.J. Beysellance
Office Phone: (504) 769-7700
FAX Machine: (504) 768-5228

Midwest Region Safety Department

Jacobs Engineering Group, Inc.
1880 Waycross Road
Cincinnati, Ohio 45240
Attention: Bill Minear
Office Phone: (513) 595-7500
FAX Machine: (513) 595-7717

Western Region Safety Department

Jacobs Engineering Group, Inc.
251 S. Lake Avenue
Pasadena, California 91101
Attention: Ken Wilkenson
Office Phone: (818) 449-2171
FAX Machine: (818) 578-6827
Home Phone: (805) 255-6973

JACOBS ENGINEERING GROUP INC.

(Division)

AUTHORIZATION FOR MEDICAL TREATMENT

TO: Dr. _____ Address: _____ Date _____

This form signed by our representative is your authority to render treatment to:

(Employee)

in accordance with the provisions of and under the conditions prescribed by the Workmens' Compensation Act. Unless the case is an emergency, kindly obtain authorization for surgery, radical procedures, or hospitalization from the insurance carrier. Send your bill and report to us at the address listed below.

Authorized RepresentativeDate of Injury _____ Location _____ Job No. _____
How Injury Occurred _____

Please complete and return by mail to the following address to insure prompt payment of charges.

Pat Costamagna, Jacobs Engineering Group, 251 S. Lake Ave
Pasadena, CA 91101 (818) 578-6886FOR DOCTOR'S USE ONLY

Diagnosis of Injury: _____

Disposition of Patient:

____ Occupational ____ Non-Occupational ____ Unable to Determine

____ Able to resume regular duties

____ Able to resume regular duties next workday

____ Able to resume restricted duties with the following limitations: _____

____ Unable to return to work, estimated length of disability: _____

Return for follow-up visit on _____ (Date)

(Doctor's Signature)

**JACOBS ENGINEERING GROUP INC.
EMPLOYEE EXPOSURE/INJURY REPORT**

Date: _____

Employee's Name: _____

SSN: _____

Sex: M ☐ F ☐ Age: _____

Region: _____ Location: _____

Project: _____ Project Title: _____

Incident:

Type: Possible Exposure _____ Exposure _____ Physical Injury _____

Location: _____

Date of Incident: _____ Time of Incident: _____

List amount of time lost from work (if any) _____

Date of Reporting Incident: _____

Person to Whom Incident was Reported: _____

Weather Condition During Incident: Temperature _____

Wind Speed and Direction _____ Humidity _____

Cloud Cover _____ Clear _____ Precipitation _____

Materials Potentially Encountered:

Chemical (give chemical name or description: liquid, solid, gas, vapor fume, mist):

Radiological: _____

**JACOBS ENGINEERING GROUP INC.
EMPLOYEE EXPOSURE/INJURY REPORT**Other: _____
_____Nature of the Exposure/Injury:

State the nature of the exposure/injury in detail and list the parts of the body affected.

(attach extra sheets if needed)

_____Was medical care received? Yes ☐ No ☐

If so, when? _____

Where? On Site _____ Off Site _____

By Whom? Name of Paramedic: _____

Name of Physician: _____

Other: _____

If "Off Site," name facility (hospital, clinic, etc.): _____

Length of stay at the facility: _____

Was the Health and Safety Manager contacted? Yes ☐ No ☐ When? _____Was the Medical Consultant contacted? Yes ☐ No ☐

If so, who was the contact? _____

Did the exposure/injury result in permanent disability? Yes ☐ No ☐

**JACOBS ENGINEERING GROUP INC.
EMPLOYEE EXPOSURE/INJURY REPORT**

If so, explain:

Has the employee returned to work? Yes [] No []

If so, give date: _____

List the names of other persons affected during this incident:

List the names of persons who witnessed the exposure/injury incident:

Possible cause of the exposure/injury:

What was the name and title of the field team leader or immediate supervisor at the site of the incident?

Was the operation being conducted under an established Safety Plan?

Yes ☐ No ☐ If yes, attach a copy. If no, explain.

**JACOBS ENGINEERING GROUP INC.
EMPLOYEE EXPOSURE/INJURY REPORT**

Describe protective equipment and clothing used by the employee:

Other information, comments (attach relative data if necessary):

Did any limitations in safety equipment or protective clothing contribute to affect exposure? If so, explain:

What was the employee doing when the exposure/injury occurred? (Describe briefly as "Site Reconnaissance," "Site Categorization," "Sampling," etc.)

How did the exposure/injury occur? (Describe fully what factors led up to and/or contributed to the incident.)

Name of person(s) initiating report, job title, phone number:

**JACOBS ENGINEERING GROUP INC.
EMPLOYEE EXPOSURE/INJURY REPORT**

Employee's Name (Print or type) _____

Employee's Signature

Date

=====

What corrective action(s) or change to the Site Safety Plan, if any, have been or will be taken to avoid recurrence of the exposure or accident?

Additional Comments:

Project Manager/Field Team Leader

(Print or Type)

(Signature)

Date

OMB DISCLOSURE STATEMENT

[illegible]

夏

| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 | Column 7 | Column 8 | Column 9 | Column 10 | Column 11 | Column 12 | Column 13 | Column 14 | Column 15 | Column 16 | Column 17 | Column 18 | Column 19 | Column 20 | Column 21 | Column 22 | Column 23 | Column 24 | Column 25 | Column 26 | Column 27 | Column 28 | Column 29 | Column 30 | Column 31 | Column 32 | Column 33 | Column 34 | Column 35 | Column 36 | Column 37 | Column 38 | Column 39 | Column 40 | Column 41 | Column 42 | Column 43 | Column 44 | Column 45 | Column 46 | Column 47 | Column 48 | Column 49 | Column 50 | Column 51 | Column 52 | Column 53 | Column 54 | Column 55 | Column 56 | Column 57 | Column 58 | Column 59 | Column 60 | Column 61 | Column 62 | Column 63 | Column 64 | Column 65 | Column 66 | Column 67 | Column 68 | Column 69 | Column 70 | Column 71 | Column 72 | Column 73 | Column 74 | Column 75 | Column 76 | Column 77 | Column 78 | Column 79 | Column 80 | Column 81 | Column 82 | Column 83 | Column 84 | Column 85 | Column 86 | Column 87 | Column 88 | Column 89 | Column 90 | Column 91 | Column 92 | Column 93 | Column 94 | Column 95 | Column 96 | Column 97 | Column 98 | Column 99 | Column 100 |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

LOCATION:

[illegible]

Attachment F

SITE MANAGER'S INVESTIGATION REPORT

WHY: PREVENTION is the primary reason. PREVENTION is the goal of accident investigation. Your investigation should be an attempt to reveal the causes so that they may be eliminated. Eliminating causes will PREVENT a recurrence.

WHAT HAPPENED: Before the causes can be determined, you, the supervisor, must get the accurate facts of what happened. These should give a clear description of what actually took place. The injured or involved person or persons are usually best able to describe what happened. Witnesses are also important. You should interview everyone involved before writing down the description.

WHY DID THIS HAPPEN: Once you know exactly what happened, you must analyze the facts and determine the causes.

First, you must determine the immediate cause or causes, such as someone's improper actions, faulty equipment, or other conditions which directly caused the accident or incident. More than one cause often exists, and you must give careful consideration to all possible causes. List them on your report.

The second part of the analysis involves some "backtracking." Think through the immediate causes you listed and try to give the reasons they existed. For example, the box that fell from a pallet of stock might be the immediate cause of injury to an employee. By "backtracking", the underlying, more fundamental causes can be determined. The pallet wasn't stacked properly. It was stacked improperly because the boxes were wet and soggy. They were wet because a section of the roof leaked and needed repairs, or because they were unloaded on an open loading dock in the rain, etc. List as many as possible. "Backtrack" as far as possible.

WHAT CORRECTIVE ACTION: After you have analyzed the causes, eliminate them. As the first-line supervisor you can probably do a great deal on your own to eliminate causes. Give additional training in safe, proper working procedures to your workers. Correct any housekeeping problems in your area of responsibility. Check machinery more often. Indicate on the report what you can do and what you have done to prevent a recurrence. For those causes beyond your direct control (such as the leaky roof in the example above), indicate what things should be done by management to eliminate the causes. This is your chance to advise them of what should be done to improve work efficiency and eliminate possible accident producing situations.

Remember—PREVENTION of recurrences is the purpose of your investigation and report. Be concise in your report. Avoid finding fault with individuals. Avoid vague, general descriptions or causes such as "carelessness". As the first-line supervisor, you are in the best position to understand the real causes of an accident or incident. Eliminating them will benefit you by providing safe working conditions for you and your workers while improving the efficiency of your crew.

SITE MANAGER'S INVESTIGATION REPORT

Required For:

Every injury requiring medical treatment
Non-injury incidents of serious potential

Disposition:

Medical treatment injuries

Employee medical file (site) - 1 copy

Manager of Safety - 1 copy

Corporate Insurance & Safety - 1 copy (attached to
Employer's First Report of Injury)

Non-injury incidents of serious potential

Site incident file - 1 copy

Manager of Safety - 1 copy

Instructions: (See Appendix 2-5.1)

| | |
|---------------------|---|
| Client: | Client's name |
| Project number: | Assigned project number |
| Name: | Name of injured party/not required if a non-injury incident report |
| Skill: | Employee's occupation |
| Department: | Department within which incident occurred |
| Age: | Age of injured |
| Location: | Location of project where incident occurred |
| Date: | Date of occurrence |
| Supervisor: | Supervisor directing employee or task |
| Time: | Time of occurrence |
| Property damage: | Was it involved? |
| What happened: | Facts revealed as to how incident occurred |
| Nature of injury: | What was the injury, if any |
| Injury potential: | Was the potential there for serious or major injury? |
| Why? | Facts revealed through investigation as to the injury cause |
| Recurrence?: | Is the potential there? |
| Corrective action?: | Retraining, equipment change, procedure change? |

SITE MANAGER'S INVESTIGATION REPORT

Client: _____ Project Number: _____

Name: _____ Department: _____ Skill: _____

Age: _____ Location: _____ Date: _____

Site Manager: _____ Time: _____

Property Damage: Yes _____ No _____

What Happened: _____

Nature of Incident: _____

Injury Potential: Major _____ Serious _____ Minor _____

Why Did This Happen?: _____

Possibility of Recurrence: Often _____ Seldom _____ Rarely _____

What Corrective Action Has Been/Will Be Taken? _____

Site Health & Safety Officer: _____ Project Manager: _____

Report Written By: _____

Date of Report: _____ Time of Report: _____

WITNESS STATEMENT

TITLE: _____

TEMPORARY ADDRESS: _____

PHONE NO. _____

PERMANENT ADDRESS: _____

PHONE NO. _____

LOCATION AT TIME OF ACCIDENT: _____

DESCRIBE, TO THE BEST OF YOUR KNOWLEDGE, HOW THE ACCIDENT
HAPPENED:

Signature

VEHICLE ACCIDENT REPORTING PROCEDURE

1.0 Purpose

To set for the minimum requirements for the timely and accurate reporting of vehicular accidents.

2.0 Scope

This procedure applies to all Region operations and projects.

3.0 Responsibilities

- 3.1 Operations Managers are responsible for assuring that their respective department, project and other managers, and supervisors fully understand and comply with this procedure and any supplementary procedure(s).
- 3.2 All managers and supervisors are responsible for assuring that all employees reporting to them fully understand and comply with this procedure and any supplementary procedure(s).
- 3.3 Any employee involved in an accident while using a Jacobs pool car, rental car on company business, or other company owned, rented, or operated vehicle or heavy equipment, shall comply with this procedure and any supplementary procedure(s).

4.0 Requirements

- 4.1 Each office and project site shall develop a supplementary vehicle accident reporting procedure to address any applicable local and state requirements and/or client requirements.
- 4.2 At a minimum, the police will be notified and a police accident report filed for any accident involving another vehicle or property when damages are estimated to be greater than \$500.00 or when there is allegedly bodily injury (more stringent requirements by local, state or client shall be addressed by a supplementary office or project procedure).
- 4.3 All vehicle and/or equipment accidents shall be verbally reported to the Pasadena Risk Management Department and Western Region Safety Department (see Exhibit A) within 24 hours of the accident.
- 4.4 The employee assigned to the vehicle or equipment, or who holds the vehicle rental agreement, shall be responsible for completing and returning the following to the Pasadena Risk Management Department:
 - Cigna "Notice of Automobile Accident" (Exhibit B);
 - Copies of any completed local, state or client required forms.
- 4.5 If the vehicle involved in the accident is a Jacobs pool car, the employee assigned to the vehicle is responsible for obtaining two written estimates for repair of the Jacobs vehicle and obtaining a copy of the police investigation report (when applicable). All information is to be sent to the Pasadena Risk Management Department.

- 4.6 If the vehicle involved in the accident is a rental vehicle, the rental company will normally take care of the repair estimates. However, the employee shall be responsible for obtaining a copy of the police investigation report (when applicable) and forwarding a copy of the Pasadena Risk Management Department.
 - 4.7 All Jacobs vehicles that are non-driveable, due to an accident, are to be towed to the nearest garage that will hold them until further instructions are received.
 - 4.8 All questions regarding vehicle insurance shall be directed to the Pasadena Risk Management Department.
 - 4.9 In the event that the employee responsible for the vehicle is, due to the accident, unable to complete the foregoing requirements, it shall be the responsibility of the respective Operations Manager or his/her designate to do so.
- 5.0 Attachments
- 5.2 Exhibit B - Cigna "Notice of Automobile Accident"

JACOBS ENGINEERING GROUP INC.
AUTO ACCIDENT REPORT

Date of Accident _____ Time of Accident _____
Location of Accident _____

Driver of Company Vehicle

Name _____ Date of Birth _____
Address _____
Home Phone No. _____ Driver's License No. _____
License Number _____
Serial Number of Vehicle _____
Name of Other Passengers in Vehicle _____
Equipment Number _____

Driver of Other Vehicle

Name of Driver _____
Home Address of Driver _____
Phone Number Home _____ Work _____
Driver's License Number (Including State) _____
Employer _____
Owner of Vehicle _____
Serial Number of Vehicle _____
Make and Model of Car _____
Relation of Driver to Owner of Vehicle _____
Insurance Company of Owner _____
Insurance Company of Driver & Policy Number _____

Description of Accident -

Description of Damage to Vehicles

Company Vehicle _____

Other Vehicle _____

Place Where Damaged Vehicles Can Be Seen _____

Injuries (Explain) _____

Name of Law Enforcement Body Investigating Accident _____
Name, Address & Phone No. of Witnesses _____

Signature _____ Date _____

Job Name: _____ Job Number: _____

AUTOMOBILE ACCIDENT OR LOSS NOTICE

ESIS, Inc.
a CIGNA company

Page 4 of 4

CIGNA

| | | |
|------------|-----------------|-------------------------------|
| CONTRACT # | NAME OR COMPANY | FILE NO. (ESIS, INA USE ONLY) |
|------------|-----------------|-------------------------------|

| LOCATION CODES | | | |
|----------------|---|---|---|
| 1 | 2 | 3 | 4 |
| | | | |

| | | |
|----------------|---------|-------|
| (1) COMPANY | NAME | PHONE |
| | ADDRESS | |

| | | | |
|---------------------|---|--|----------|
| (2) TIME & PLACE | DATE & TIME OF LOSS OR ACCIDENT | | LOCATION |
| | <input type="checkbox"/> A.M. <input type="checkbox"/> P.M. | | |

| | | | | | | |
|--|--|------|-------|---------------------------------------|--------------|---|
| (3) AUTO USED OR OCCUPIED BY CLIENT MUST GIVE DRIVER'S AGE | YEAR | MAKE | MODEL | SERIAL NUMBER | MOTOR NUMBER | LICENSE NO., YEAR & STATE |
| | NAME OF OWNER | | | ADDRESS | | <input type="checkbox"/> HOME PHONE <input type="checkbox"/> BUS. |
| | NAME OF DRIVER | | | ADDRESS | | <input type="checkbox"/> HOME PHONE <input type="checkbox"/> BUS. |
| | RELATION TO OWNER (EMPLOYEE, ETC.) | | | WAS CAR USED WITH OWNER'S PERMISSION? | | OTHER INSURANCE |
| | <input type="checkbox"/> YES <input type="checkbox"/> NO | | | | | |
| | FOR WHAT PURPOSE WAS AUTO BEING USED AT TIME OF ACCIDENT | | | | | |
| | WHERE MAY AUTO BE SEEN (ADDRESS)? | | | | | ESTIMATED COST OF REPAIRS |
| | IF THEFT, SPECIFY PROPERTY STOLEN. IF COLLISION OR COMPREHENSIVE, SPECIFY DAMAGE | | | | | |
| DATE, LOCATION & BADGE NO. OR NAME OF POLICE AUTHORITY TO WHOM ACCIDENT WAS REPORTED | | | | | | |

| | | | | |
|---|--|---------------------------------|---------------------------|---|
| (4) DAMAGE TO PROPERTY OF OTHERS Use Additional Sheet If Necessary | OWNER | | ADDRESS | <input type="checkbox"/> HOME PHONE <input type="checkbox"/> BUS. |
| | OTHER DRIVER — SAME AS ABOVE <input type="checkbox"/> | | ADDRESS | OPERATOR LICENSE # |
| | LIST DAMAGE, IF AUTO, MAKE YEAR, LICENSE NUMBER, YEAR & STATE | | ESTIMATED COST OF REPAIRS | |
| | WAS OTHER CAR INSURED? <input type="checkbox"/> YES <input type="checkbox"/> NO | NAME OF COMPANY & POLICY NUMBER | | |

| | | | | | | | | | | | |
|---------------------------|------|--|--|--|---------|--|-------|-----|--------------|-----------|--------------------|
| (5) PERSONS INJURED | NAME | | | | ADDRESS | | PHONE | AGE | PASSENGER IN | | EXTENT OF INJURIES |
| | | | | | | | | | CLIENT CAR | OTHER CAR | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

For your protection California law requires the following to appear on this form. Section 556 of the Insurance Code reads as follows:

(a) Present or cause to be presented any false or fraudulent claim for the payment of a loss under a contract of insurance.

(b) Prepare, make, or subscribe any writing, with intent to present or use the same or to allow it to be presented or used in support of any such claim.

Every person who violates any provision of this section is punishable by imprisonment in the State prison not exceeding three years, or by fine not exceeding one thousand dollars or by both.

SEE REVERSE SIDE FOR ACCIDENT DESCRIPTION AND OTHER INFORMATION

DATE

SIGNATURE OF CLIENT OR DRIVER

2.4 VEHICLE ACCIDENTS

2.4.1 Reporting

- o An Auto Accident Form (Appendix 2-7) shall be kept in all Company vehicles utilized for offsite service.
- o The form shall be completed by the driver of the vehicle in conjunction with his Supervisor and the Project Superintendent and forwarded within 24 hours after an accident to the Corporate Safety Department.

2.4.2 Requirements

- o The report shall be filed when a Company vehicle is involved in any type of accident.
- o The form shall also be used in filing reports of accidents involving equipment vehicles (onsite or offsite) such as cherry pickers, backhoes, trucks, cars, etc.

2.4.3 Distribution

- o The report shall be distributed as follows:
 - Equipment Yard - 1 Copy
 - Site File - 1 Copy
 - Corporate Insurance - Original
 - Corporate Safety Department - 1 Copy

Attachment J

HUMAN RESOURCES CONTACTS

Central Region Human Resources Department

Jacobs Engineering Group Inc.
4848 Loop Central Drive
Houston, Texas 77081-2211
Attention: Barry Rogers
Office Phone: (713) 669-2200
FAX Machine: (713) 669-0045

Eastern Region Human Resources Department

Jacobs Engineering Group Inc.
1880 Waycross Road
Cincinnati, Ohio 45240
Attention: John Kadash
Office Phone: (513) 595-7500
FAX Machine: (513) 595-7717

Midwest Region Human Resources Department

Jacobs Engineering Group Inc.
1880 Waycross Road
Cincinnati, Ohio 45240
Attention: John Kadash
Office Phone: (513) 595-7500
FAX Machine: (513) 595-7717

Western Region Human Resources Department

Jacobs Engineering Group Inc.
251 S. Lake Avenue
Pasadena, California 91101
Attention: William Gebhardt
Office Phone: (818) 578-6886
FAX Machine: (818) 578-6837

Corporate Human Resources Department

Jacobs Engineering Group Inc.
251 S. Lake Avenue
Pasadena, California 91101
Attention: William Gebhardt
Office Phone: (818) 578-6886
FAX Machine: (818) 578-6837

OSHA No. 101
Case or File No. _____

Form approved
OMB No. 44R 1453

Supplementary Record of Occupational Injuries and Illnesses

EMPLOYER

1. Name _____
2. Mail address _____
(No. and street) (City or town) (State)
3. Location, if different from mail address _____

INJURED OR ILL EMPLOYEE

4. Name _____ Social Security No. _____
(First name) (Middle name) (Last name)
5. Home address _____
(No. and street) (City or town) (State)
6. Age _____ 7. Sex: Male _____ Female _____ (Check one)
8. Occupation _____
(Enter regular job title, not the specific activity he was performing at time of injury.)
9. Department _____
(Enter name of department or division in which the injured person is regularly employed, even though he may have been temporarily working in another department at the time of injury.)

THE ACCIDENT OR EXPOSURE TO OCCUPATIONAL ILLNESS

10. Place of accident or exposure _____
(No. and street) (City or town) (State)
 If accident or exposure occurred on employer's premises, give address of plant or establishment in which it occurred. Do not indicate department or division within the plant or establishment. If accident occurred outside employer's premises at an identifiable address, give that address. If it occurred on a public highway or at any other place which cannot be identified by number and street, please provide place references locating the place of injury as accurately as possible.
11. Was place of accident or exposure on employer's premises? _____ (Yes or No)
12. What was the employee doing when injured? _____
(Be specific. If he was using tools or equipment or handling material, name them and tell what he was doing with them.)

13. How did the accident occur? _____
(Describe fully the events which resulted in the injury or occupational illness. Tell what happened and how it happened. Name any objects or substances involved and tell how they were involved. Give full details on all factors which led or contributed to the accident. Use separate sheet for additional space.)

OCCUPATIONAL INJURY OR OCCUPATIONAL ILLNESS

14. Describe the injury or illness in detail and indicate the part of body affected. _____
(e.g.: amputation of right index finger at second joint; fracture of ribs; lead poisoning; dermatitis of left hand, etc.)
15. Name the object or substance which directly injured the employee. (For example, the machine or thing he struck against or which struck him; the vapor or poison he inhaled or swallowed; the chemical or radiation which irritated his skin; or in cases of strains, hernias, etc., the thing he was lifting, pulling, etc.) _____
16. Date of injury or initial diagnosis of occupational illness _____
(Date)
17. Did employee die? _____ (Yes or No)

OTHER

18. Name and address of physician _____
19. If hospitalized, name and address of hospital _____
- Date of report _____ Prepared by _____
 Official position _____

SUPPLEMENTARY RECORD OF OCCUPATIONAL INJURIES AND ILLNESSES

To supplement the Log and Summary of Occupational Injuries and Illnesses (OSHA No. 200), each establishment must maintain a record of each recordable occupational injury or illness. Worker's compensation, insurance, or other reports are acceptable as records if they contain all facts listed below or are supplemented to do so. If no suitable report is made for other purposes, this form (OSHA No. 101) may be used or the necessary facts can be listed on a separate plain sheet of paper. These records must also be available in the establishment without delay and at reasonable times for examination by representatives of the Department of Labor and the Department of Health, Education and Welfare, and States accorded jurisdiction under the Act. The records must be maintained for a period of not less than five years following the end of the calendar year to which they relate.

Such records must contain at least the following facts:

- 1) *About the employer*—name, mail address, and location if different from mail address.
- 2) *About the injured or ill employee*—name, social security number, home address, age, sex, occupation, and department.
- 3) *About the accident or exposure to occupational illness*—place of accident or exposure, whether it was on employer's premises, what the employee was doing when injured, and how the accident occurred.
- 4) *About the occupational injury or illness*—description of the injury or illness, including part of body affected; name of the object or substance which directly injured the employee; and date of injury or diagnosis of illness.
- 5) *Other*—name and address of physician; if hospitalized, name and address of hospital; date of report; and name and position of person preparing the report.

SEE DEFINITIONS ON THE BACK OF OSHA FORM 200.

CODE OF SAFE PRACTICES

- A. Following is the basic Code of Safe Practices that applies at all times to all work being conducted on this Project.
1. These safety rules are not inclusive, and all Federal and State safety regulations shall also be applicable.
 2. Where a conflict exists between a Federal, State, and/or other applicable safety rule, the more restrictive requirement shall be in force on the job site.
- B. This is a recommended format. It is general in nature and intended as a basis for the preparation of a code of safe practices by the contractor that fits his/her operation more exactly. As a minimum performance standard, it shall be adopted and enforced by each contractor performing construction work on this project.
1. Hard hats shall be worn at all times in construction areas.
 2. Sleeved shirts shall be worn at all times.
 3. Long pants shall be worn at all times.
 4. Leather shoes shall be worn at all times; no tennis or running shoes will be allowed.
 5. Adequate eye protection shall be worn when cutting, grinding, sawing or conducting any other activity that poses a potential eye hazard.
 6. Safety belts with lanyards shall be used at unprotected heights of more than 6'-0"; this includes working on a ladder when more than 6'-0" above the ground or floor.
 7. Hearing protection shall be worn when employees are exposed to noise levels requiring hearing protection as defined by Federal or State health and safety standards.
 8. Illegal drugs, alcohol, fire arms, or other dangerous substances shall not be allowed on the job site.
 9. Good housekeeping practices shall be maintained continually.
 10. Any time work is performed overhead, the contractor conducting such work shall erect a barricade.
 - a. The barricade shall consist of caution or danger barricade tape and appropriate warning signs.
 - b. All barricades shall be removed when not in use.
 - c. Contractor employees shall be required to honor the barricades erected by other contractors on the job site.
 11. All persons shall follow these safe practices rules, render every possible aid to safe operations and report all unsafe conditions or practices to the supervisor.

12. Foremen shall ensure that employees observe and obey every applicable Company, State, or Federal regulation and order as is necessary to the safe conduct of the work, and shall take such action as is necessary to obtain compliance.
13. All employees shall be given frequent accident prevention instruction. Instruction shall be given at least every five work days.
14. Anyone known to be under the influence of drugs or an intoxicating substance that impairs the employee's ability to safely perform the assigned duties shall not be allowed on the job while in that condition.
15. Horseplay, scuffling, and other acts which tend to have an adverse influence on the safety or well-being of the employees shall be prohibited.
16. Work shall be well planned and supervised to prevent injuries in the handling of materials and in working together with equipment.
17. No employee shall knowingly be permitted or required to work while his/her ability or alertness is so impaired by fatigue, illness, or other causes that the employee or others might be exposed to injury unnecessarily.
18. Employees shall not enter manholes, underground vaults, chambers, tanks, silos, or other similar spaces unless it has been determined that it is safe to enter.
19. Employees shall be instructed to ensure that all guards and other protective devices are proper and adjusted and shall report deficiencies promptly to the supervisor.
20. Electric cords shall not be exposed to potential damage from vehicles.
21. In locations where the use of a portable power tool is difficult, the tool shall be supported by means of a rope or similar support of adequate strength.
22. Only trained and authorized persons shall operate machinery or equipment.
23. Loose or frayed clothing, loose or hanging long hair, dangling ties, finger rings, etc., shall not be worn around moving machinery or other areas where they may become entangled.

24. Machinery shall not be serviced, repaired, or adjusted while in operation, nor shall oiling of moving parts be attempted, except on equipment that is designed or fitted with safeguards to protect the person performing the work.
25. Where appropriate, lock-out procedures shall be used.
26. Employees shall not work under vehicles supported by jacks or chain hoists without protective blocking that will prevent injury if jacks or hoists should fail.
27. Air hoses shall not be disconnected compressors until the hose line has been bled.
28. Excavating, trenching, and shoring operations shall be supervised by a "competent person" (refer to OSHA and/or Jacobs during all stages of field activity).
29. All excavations shall be inspected visually before backfilling to ensure that it is safe to backfill.
30. Excavating equipment shall not be operated near tops of cuts, banks, or cliffs if employees are working below.
31. Tractors, bulldozers, scrapers, and carryalls shall not operate where there is a possibility of overturning in dangerous areas like edges of deep fills, cut banks, and steep slopes.
32. When loading where there is a probability of dangerous slides or movement of material, the wheels or treads of loading equipment, other than that riding on rails, should be turned in the direction which will facilitate escape in case of danger, except in a situation where this position of the wheels or treads would cause a greater operational hazard.
33. Workers shall not handle or tamper with any electric equipment in a manner not within the scope of their duties, unless they have received instructions from a qualified, licensed electrician.
34. All injuries shall be reported promptly to the foreman and the Prime Contractor so that arrangements can be made for medical or first aid treatment.
35. No burning, welding, or other source of ignition shall be applied to any enclosed tank or vessel, even if there are some openings, until it has first been determined that no possibility of explosion exists and authority for the work is obtained from the foreman or superintendent.

**ACKNOWLEDGMENT OF RECEIPT AND
REVIEW OF CODE OF SAFE PRACTICES**

TO ALL EMPLOYEES:

ATTACHED IS A COPY OF THE CODE OF SAFE PRACTICES. THESE
GUIDELINES ARE PROVIDED FOR YOUR SAFETY.

IT IS THE RESPONSIBILITY OF _____ TO
PROVIDE AND
(name of contractor)

REVIEW THIS CODE WITH EACH EMPLOYEE. IT IS THE EMPLOYEE'S
RESPONSIBILITY TO READ AND COMPLY WITH THIS CODE.

THE ATTACHED COPY OF THE CODE OF SAFE PRACTICES IS FOR YOU TO
KEEP. PLEASE SIGN AND DATE BELOW AND RETURN ONLY THIS PAGE TO

*p2401Y _____
(name)

I HAVE READ AND UNDERSTAND THE CODE OF SAFE PRACTICES.

Date

Employee

Social Security Number

Signature

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE